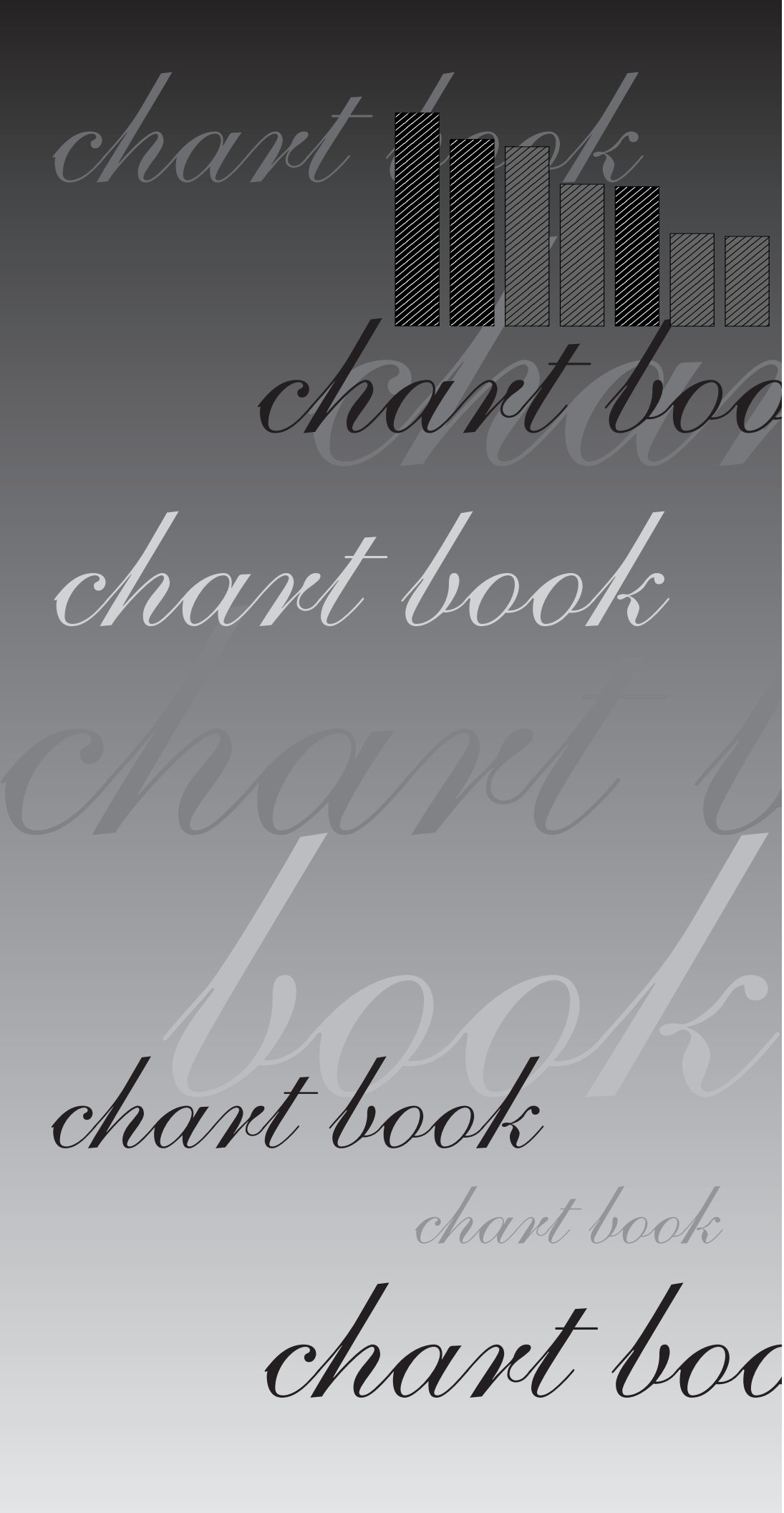
Morbidity & Mortality: 2000 Chart Book on Cardiovascular, Lung, and Blood Diseases

NATIONAL INSTITUTES OF HEALTH
NATIONAL HEART, LUNG, AND BLOOD INSTITUTE

The bar graph on the front cover depicts the seven most prevalent major chronic conditions: arthritis, orthopedic impairments, HYPERTENSION, HEART DISEASE, hearing impairments, ASTHMA, and CHRONIC BRONCHITIS determined from respondent reporting in national health interviews.



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For Administrative Use

National Institutes of Health

National Heart, Lung, and Blood Institute

Foreword

The mission of the National Heart, Lung, and Blood Institute (NHLBI) is to provide leadership and support for research in cardiovascular, lung, and blood diseases; sleep disorders; women's health; and blood resources. The ultimate goal is to improve the health and well-being of the American people. While program priorities are determined primarily by research opportunities, other factors have an influence: the magnitude, distribution, and trends of these diseases in the United States, as well as the ability to improve the Nation's health. In addition, congressional mandates and the health needs of the country as perceived by Institute staff or outside advisory groups, and recommendations from the National Heart, Lung, and Blood Advisory Council, all have a significant impact on establishing research priorities.

Evaluation of the Institute's program balance and program impact is a continuous process that relies on assessments of morbidity and mortality in the United States from heart, lung, and blood diseases. Consideration is given to their distribution among the population; to their trends over time; and to related statistics on population risk factors, lifestyles, medical care, and economic impact.

This Chart Book, like its predecessors, is a resource that provides information for a limited set of common cardiovascular, lung, and blood diseases. Charts with age-adjusted death rates are based on the age distribution of the projected population for the year 2000. The new standard, which replaces the 1940 standard, was approved by the Department of Health and Human Services for official, nationwide implementation beginning with the 1999 mortality statistics. Since the change has a significant impact on mortality statistics, the NHLBI decided to apply the new standard in this Chart Book. For continuity, the same charts, but adjusted to the traditional 1940 standard, are also presented.

I would like to express my appreciation to Mr. Thomas Thom of the NHLBI for his time and effort in developing the material presented in this Chart Book.

Claude Lenfant, M.D.
Director
National Heart, Lung, and Blood Institute

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1. Introduction

During the past 30 years, major advances have been made in the prevention, diagnosis, and treatment of cardiovascular, lung, and blood diseases. Death rates from cardiovascular diseases (CVD) have declined significantly, and the American people are living longer, healthier lives. Yet, despite the tremendous progress that has been made, morbidity and mortality from cardiovascular, lung, and blood diseases continue to contribute to the immense burden experienced by many individuals and their families, and the economic cost to the Nation is substantial.

This Chart Book describes the magnitude of the problem and time trends of these diseases, highlighting demographic differences—age, sex, and minority/ethnic status. Morbidity and mortality statistics are given for cardiovascular, lung, and blood diseases in the United States as well as for states and selected countries.

The Background Data chapter provides population and life-expectancy estimates, trends in total mortality, and statistics that show leading causes of morbidity and mortality, economic costs of disease, and prevalence of CVD risk factors. The Cardiovascular Diseases, Lung Diseases, and Blood Diseases chapters contain morbidity and mortality statistics on diseases listed in the Contents. Diseases included under the three headings are listed in the first table in each chapter together with appropriate diagnostic codes of the ninth revision of the *International Classification of Diseases* (ICD).

The age-adjustment standard—age distribution of the population in 2000—is used for the age-adjusted charts in Chapters 2 through 5 of this book. Charts with rates age-adjusted to the old 1940 standard appear in Chapter 6 for comparison. A discussion of the reasons for the new standard and its impact on the calculation of mortality levels, demographic comparisons, and trends may be found in Chapter 6 of the 1998 Chart Book.

Sources of Data

Most of the statistical information used in this book was obtained from the National Center for Health Statistics (NCHS): specifically, the annual vital statistics of the United States; the annual National Health Interview Survey (NHIS); the National Health and Nutrition Examination Survey (NHANES), 1971-1975, 1976-1980, and 1988-1994; the annual National Hospital Discharge Survey; and the annual National Ambulatory Medical Care Survey. International mortality data came from the *World Health Statistics Annual* of the World Health Organization (WHO) and the WHO website.

It is beyond the scope of the Chart Book to list and cite all of the NCHS, WHO, and Bureau of the Census publications and data tapes that were used to prepare this document. Specific data sources for current statistics and general references to hospital and prevalence surveys and vital statistics for earlier data years may be found in the Reference section.

Population Estimates

Annual population estimates are used by the NCHS and the NHLBI to calculate death rates. For the census enumeration years (e.g., 1950, 1960), the estimates express the population count as of April 1; for the intervening years they indicate the population estimate as of July 1. Death rates before 1961 were obtained directly from NCHS vital statistics publications. Rates for 1961-1969 and 1981-1989 were calculated by the NCHS or the NHLBI using population estimates from the Bureau of the Census that were revised after the published rates appeared in the volumes of vital statistics. Thus, the calculated rates differ from the published vital statistics. From 1968-1997, the NCHS and the NHLBI used data from public use mortality tapes and U.S. Bureau of the Census population estimates to calculate mortality rates.[1-6] The 1998 estimates

could only be provided by personal communication with the NCHS; the mortality statistics for that year are considered preliminary.

International Classification of Diseases

The diagnostic terminology used in this book is similar to the one found in the ninth revision of the ICD (ICD/9).[7] Appendix A consists of tables with this terminology and the 1 through 9 ICD revisions codes for selected diagnostic categories.

Quality of Data

Information from national sample surveys is used to determine disease and risk factor prevalence. The surveys consist of a heath interview in which the respondents provide self-reporting data reflecting a doctor's diagnosis of their disease and a physical examination in which the blood pressure, blood cholesterol levels, and weight of participants are measured and smoking habits are documented. Physician office visit data are derived from information provided in physician questionnaires and are based on the diagnostic information recorded in patient medical records. No estimates are provided for prevalence, hospitalizations, or physician office visits if the relative standard error is 30 percent or greater. The major limitation of these surveys is the quality of the diagnostic information.

Hospital Statistics

Hospitalization rates are a useful measure of health care utilization. National hospitalization and hospital case-fatality statistics, however, have limitations associated with diagnostic accuracy and diagnostic comparability over time (e.g., the diagnosis may be influenced by the billing process). Moreover, time trends may not accurately reflect real changes in incidence and case-fatality because the data occasionally include changes in hospital admission practices. Nevertheless, diagnoses obtained from hospital records are accepted as reported.

The term "hospitalizations," which replaces the National Hospital Discharge Survey term "hospital discharges," refers to all patients, whether discharged alive or dead. The diagnosis given at discharge, and not at admission, is used. Most tabulations of hospitalizations are for first-listed diagnoses on the hospital record, i.e., primary diagnosis. Some tabulations are of the "all-listed" diagnoses that include both primary and secondary diagnoses for a particular disease. The National Hospital Discharge Survey is event-based rather than patient-based and does not distinguish between patients who were hospitalized multiple times for the same diagnosis and patients who were hospitalized only once in a given year. Each hospitalization is treated as a discrete event and is counted accordingly.

Cause-of-Death Statistics

Limitations of cause-of-death statistics, apart from discontinuities over time caused by revisions in the ICD, are well known. Less well known is the break in continuity in 1989 caused by the insertion of cause-of-death instructions on the back of death certificates. Inaccuracies in death certification and inconsistencies in selecting and coding the underlying cause of death create uncertainties as to the true magnitude of mortality from a specific cause compared with other causes. These uncertainties also must be kept in mind when comparing the same cause of death over time or the same cause of death between demographic groups or countries. Selecting only one cause of death as the underlying cause has the advantage of diagnostic specificity, but the disadvantage of an incomplete accounting of the various causes that contributed to the death. Because of the complexity of basing mortality statistics on tabulations of both the underlying (primary) and contributing (secondary) causes of death, most data are for the underlying causes.

Another limitation related to cause-of-death statistics concerns cross-national comparisons of vital statistics. Comparisons of mortality data for

coronary heart disease (CHD), stroke, and chronic obstructive pulmonary disease (COPD) among countries are affected by differences in diagnostic practices and physician training, interpretation of internationally recommended rules for coding a cause of death, availability of diagnostic aids, and the use of autopsies. Information presented in this book is limited to countries that are known to produce high-quality statistics.

ICD Revisions

Revisions in the ICD have affected the comparability of time trends for some diagnoses, particularly those associated with mortality. Because discontinuity across recent ICD revisions is especially large for CHD from 1968 to 1978, a comparability ratio—0.8784 based on the ICDA/8 to ICD/9 revisions—was applied to CHD age-adjusted death rates for this period.[8] As a result, comparability for total CHD mortality is assumed to be reasonably good during the 1950-1998 period. However, this assumption is not made for age-, race-, or sex-specific mortality. Breaks between revisions are shown on many of the time-trend figures in which comparability is a concern. Coding rules and practices are not universal, so differences that affect comparability of cause-specific morbidity and mortality exist in diagnosis coding by countries, states, and demographic groups.

Data Presentation

Special attention is directed to certain issues involving data presentation in the Chart Book. The following information addresses these topics.

Age-Adjustment of Rates

Direct age adjustment of U.S. death rates follows the procedure used by the NCHS, but with a new age-adjustment standard, the 2000 U.S. population in 10-year age groups.[9-10] This standard is also used to summarize the age-specific prevalence for diseases and risk factors based on the NHANES data. The European standard population, however, is used for age adjustment for international mortality statistics.[11]

Chapter 6 includes charts based on the 1940 standard. Officially, this standard will continue to be used to report vital statistics through the 1998 data year. Because of the relatively young population in 1940, rates are lower than those obtained with the new standard. Regardless of the standard used, the major advantage of age adjustment is to remove the effects of age distribution differences when comparing mortality over time or by sex, race, ethnicity, or geographic location.[12]

The major disadvantage of using age-adjusted rates is loss of age-specific information. This becomes evident when the population groups being compared have mortality differences that are not in the same direction over a given age range. For example, the bar chart (Chart 3-28) for heart disease mortality has higher age-adjusted rates for whites than for blacks, but the line chart (Chart 3-29) by age shows higher rates for whites only at the oldest ages.

Percent Change

Percent changes in death rates over time, whether between two years or on an average annual basis, are calculated from log-linear regression slopes of rates for each year of a selected time period.[13] They may be influenced by unusually high or low values, especially if the period is short. They do not provide information about the levels on which they are based, which might be small. Average annual percent changes should not be summed over a period because the sum will be more than the percent change from the first to the last year in the period. Average annual percent changes give the appearance of small differences in the comparisons being made. An exception to the use of log-linear regression to calculate percent change is made for Chart 3-6 and Chart 3-6 (1940). For these tables, it is useful to have the percent change and other calculations based on the actual death rates.

Horizontal and Vertical Scales

Comparisons between time-trend charts are complicated because ranges of the horizontal and vertical scales are not uniform and may be truncated. Vertical scales for less common diagnoses are magnified to focus on age, race, and sex differences.

Arithmetic and Logarithmic Scales

Death rates in most time-trend graphs in the first Chart Book (prepared in 1990) were plotted on a logarithmic Y-scale to reflect their relative (or percent) change over time. In the current Chart Book, time trends in death rates were plotted on an arithmetic Y-scale to show their absolute change relative to zero. Note, however, that on an arithmetic scale, the absolute increase or decrease for a smaller death rate might be modest compared with the change for a larger death rate, but the percent change over time can be greater for the smaller rate. Note also that on an arithmetic scale, a decline can be slowing, whereas the rate of decline, if plotted on a logarithmic scale, might not be slowing. Where particularly appropriate, these differences are discussed in the chart text.

Truncated Age Ranges

The age range for death rates in some charts excludes groups older than 84 years because of the difficulty associated with obtaining accurate diagnoses for these patients who often have other contributing comorbidities. Selected truncated age groups are frequently used for U.S. data to highlight specific premature adult morbidity and mortality. For international comparisons, the age range 35-74 was chosen so that differing age distributions among countries would be minimized in rate calculations.

Diagnostic Categories

Selection of diagnostic groups to present depends on data availability, data quality, and influences of the ICD revisions. Additional information related to diagnostic categories may be found in Chapters 3, 4, and 5.

Demographic Characteristics

The Chart Book provides prevalence and mortality information for various racial and ethnic groups. Several charts show comparisons between blacks and whites, but others, notably when showing time trends, present data for nonwhites instead of data for blacks. While many charts provide a race/sex comparison, others present data for total males and total females or for total whites and total blacks to highlight important points that otherwise would be lost if a four-way combination were used.

The term "American Indian" is used to refer to the population that consists of American Indians and Alaska Natives. The term "Asian" is used to include the population that consists of Asians and Pacific Islanders. Data on socioeconomic groups are not presented because they are extensively presented elsewhere.[14]

State Mortality

Death rates for total population by state are shown for CVD, CHD, stroke, and COPD.[15] Although state maps that combine all age, race, and sex groups can be misleading, the included maps show a reasonably similar geographic pattern compared with maps that are either race and sex specific or confined to a specific age range (not shown). This situation is true even for stroke mortality, in which high rates in southern states are not due merely to the large black population. Although rankings of certain states for CHD mortality differ markedly from rankings for total heart disease, the two geographic patterns are not much different.[16]

Time Periods

Time-trend statistics are current and extend as far back as permitted by the availability of comparable data. The focus in some charts is on the year 1963. After application of a comparability ratio to age-adjusted death rates for 1968 to 1978 for CHD, 1963 was determined to be the peak year before the decline began.

2. Background Data

The tables and figures in this chapter provide population estimates, life expectancy, morbidity and mortality information, and economic cost data for cardiovascular, lung, and blood diseases. Most of the charts focus on the leading causes of death, but a few show prevalence of specific CVD risk factors.

Prevalence, incidence, and mortality estimates for selected cardiovascular, lung, and blood diseases, derived from various data sources, are presented in the next few paragraphs with minimal explanation of their definition, source, or quality. Except as referenced, they should be attributed only to the NHLBI.

Cardiovascular diseases. An estimated 59.7 million Americans have CVD—50 million of them, about one-fourth of the adult population, have hypertension.*[17-19] The prevalence of CHD is approximately 12.2 million—7.2 million have acute myocardial infarction (AMI) and 6.3 million have angina pectoris as determined from the Rose Angina Questionnaire. Persons with unrecognized CHD are not included. According to the same source, an estimated 4.4 million Americans have stroke, 4.6 million have congestive heart failure (CHF), and 1 million have congenital heart defects. The prevalence of atrial fibrillation is 2 million.

Approximately 1.1 million—650,000 first and 450,000 recurrent—heart attacks occur each year in the United States, with about 450,000 resulting in death.[6, 20-21] The term "heart attack" includes overt AMI and CHD death. Angina pectoris, not complicated by an AMI, is not included. In 1996, an estimated 225,000 people died of CHD without being hospitalized.[22]

An estimated 600,000—500,000 first and 100,000 recurrent—strokes occur each year in the United States, and almost 160,000 result in death.[12, 23] An estimated 550,000 new cases of heart failure occur each year.[24] Congenital heart disease is estimated to occur in one of every eight live births, resulting in about 32,000 new cases each year.

Lung diseases. Fifteen million Americans are estimated to have COPD—14.1 million of them have chronic bronchitis, 1.8 million have emphysema, and almost a million have both conditions.[25] The prevalence of asthma is approximately 14.6 million. Other chronic lung diseases include cystic fibrosis, which affects an estimated 30,000 Americans, with incidence estimated to be 2,500 births each year; and respiratory distress syndrome, which occurs in 40,000 babies and 150,000 adults each year.

Blood diseases. An estimated 3.5 million Americans have some form of anemia.[25] An estimated 72,000 blacks—1 of 500 black births—have sickle cell anemia, 20,000 persons have hemophilia, and 1,000 persons have Cooley's anemia.

* The definition of hypertension is systolic blood pressure of 140+ mmHg or diastolic pressure of 90+ mmHg or on antihypertensive medication. The estimate is an extrapolation to the 1991 U.S. population of unpublished prevalence rates from the NCHS's NHANES, 1988-1991.

Background Data

Chart 2-1
Total Population by Mean Age, Percent Age 65+, Race/Ethnicity, and Sex, U.S., 2000

	Total Population			Male			Female		
	Pop. (Mil.)	Mean Age	Percent 65+	Pop. (Mil.)	Mean Age	Percent 65+	Pop. (Mil.)	Mean Age	Percent 65+
Total	274.6	36.5	12.6	134.2	35.1	10.7	140.4	37.7	14.5
White	225.5	37.4	13.7	110.8	36.1	11.6	114.7	38.7	15.7
Black	33.4	31.9	8.1	16.8	30.3	6.7	18.6	33.3	9.5
Indian	2.4	30.5	6.9	1.2	29.6	5.7	1.2	31.4	8.0
Asian	11.2	32.4	7.3	5.4	31.3	6.2	5.9	33.4	8.3
Hispanic*	31.4	29.2	6.0	15.8	28.4	5.0	15.6	30.0	7.0

* Hispanic can be of any race.
Note: Estimates may not add to total due to rounding.

The mean age and percent age 65+ of minority populations in the U.S. are lower than the mean age and percent age 65+ of the white population. This holds true for both males and females.[10]

Chart 2-2
Percent of Total Population Age 65+ by Race and Sex, U.S., 2000, 2010, and 2020

Year	Total	Male	Female	Total White	White Male	White Female	Total Black	Black Male	Black Female
2000	12.6	10.7	14.5	13.7	11.6	15.7	8.1	6.7	9.5
2010	13.2	11.6	14.8	14.4	12.6	16.0	8.6	7.1	9.9
2020	16.5	15.0	17.9	17.9	16.5	19.4	11.1	9.4	12.5

By the year 2020, 16.5% of Americans will be age 65+ compared with 12.6% in 2000.[10]

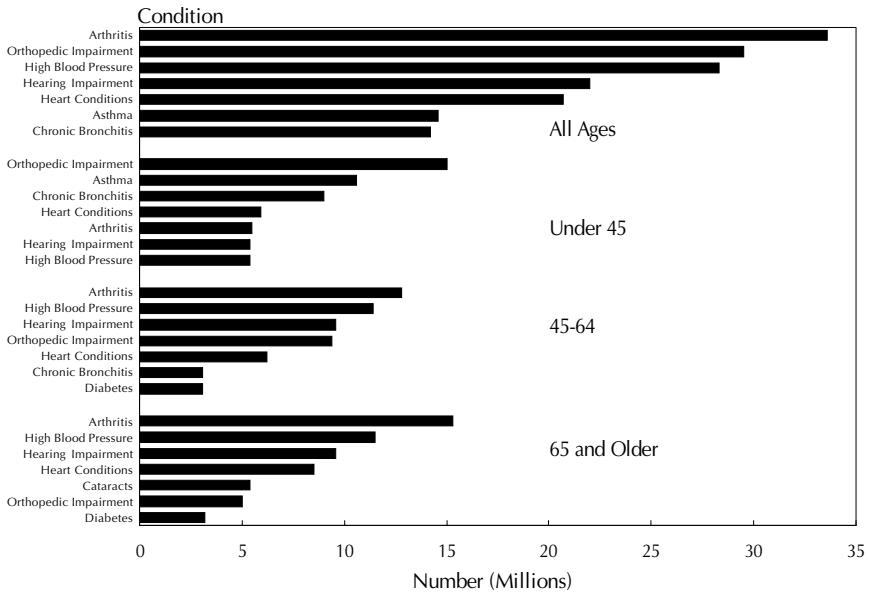
Chart 2-3
Average Remaining Lifetime by Age, Race, and Sex, U.S., 1997

Year	Total	Male	Female	Total White	White Male	White Female	Total Black	Black Male	Black Female
Birth	76.5	73.6	79.4	77.1	74.3	79.9	71.1	67.2	74.7
15	62.3	59.4	65.1	62.8	60.0	65.5	57.5	53.6	61.0
35	43.4	40.8	45.7	43.8	41.3	46.1	39.1	35.9	42.0
65	17.7	15.9	19.2	17.8	16.0	19.3	16.1	14.2	17.6
75	11.2	9.9	12.1	11.2	9.9	12.1	10.7	9.3	11.5

Average life expectancy at birth was 76.5 years in 1997—79.4 years for females compared with 73.6 for males and 77.1 years for whites compared with 71.1 years for blacks.[26]

Background Data

Chart 2-4
Prevalence of Leading Chronic Conditions by Age, U.S., 1996



In 1996, asthma, chronic bronchitis, high blood pressure, and heart conditions were among the most common chronic conditions for individuals under age 65. High blood pressure and heart conditions were among the most common conditions for those age 65 and older.[25]

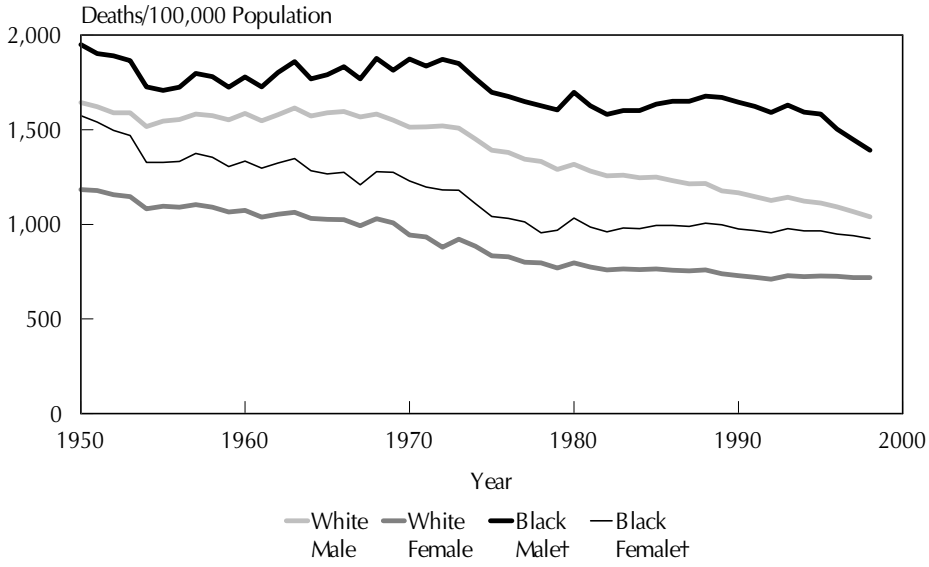
Chart 2-5
Prevalence of Leading Chronic Conditions Causing Limitation of Activity, U.S., 1993-1995

Chronic Condition	Prevalence (Millions)
Orthopedic impairments	10.1
Arthritis	7.1
Heart disease	5.1
Hypertension	3.0
Asthma	2.9
Intervertebral disc disorders	2.9
Diabetes	2.7
Mental retardation	1.4
Visual impairments	1.4
Hearing impairments	1.3
Cerebrovascular disease	1.2
Paralysis	1.0
Emphysema	0.8

In 1993-95, heart disease was the third most prevalent chronic condition causing activity limitation. Hypertension, asthma, cerebrovascular disease, and emphysema were also common chronic conditions causing activity limitation.[27]

Background Data

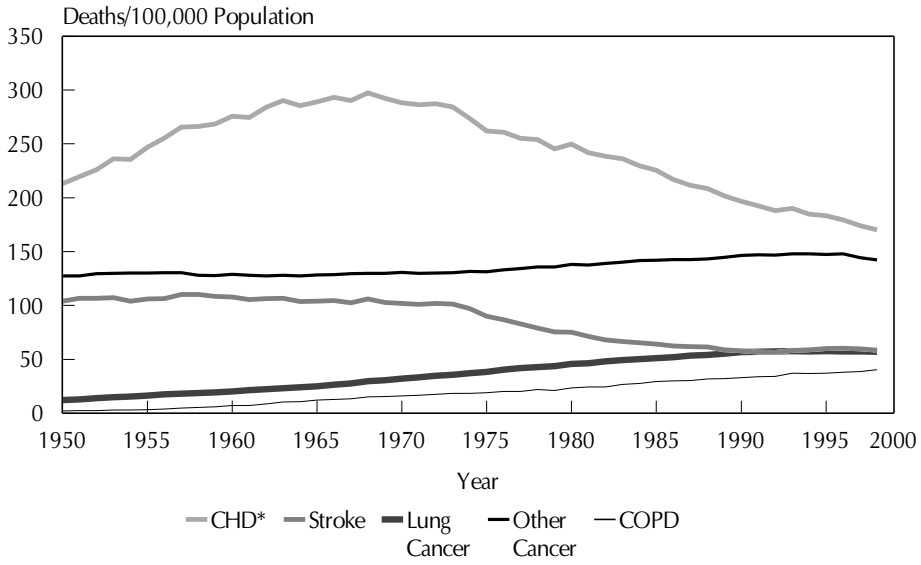
Chart 2-6
Age-Adjusted Death Rates* for All Causes by Race and Sex, U.S., 1950-1998



The all-cause death rates in males have declined over 30 years. The declines were more rapid in the 1970s than in the 1980s and 1990s. For women, the trend has been similar, even though the decline began much earlier.[15, 22, 28]

* Age-adjusted to the 2000 standard.
† Nonwhite from 1950-1967.

Chart 2-7
Crude Death Rates for Selected Causes, U.S., 1950-1998



Among the leading causes of death, lung cancer and COPD mortality increased as CHD and stroke mortality declined. Although the rates of decline for CHD and stroke were similar, in absolute terms, the decline for CHD was greater than for stroke.[15, 22, 28, 29]

* Comparability ratio applied to rates for years 1968-1978.

Background Data

Chart 2-8
Leading Causes of Death, U.S., 1998

Cause of Death	Number
Total	2,338,075
1 Heart disease*	724,269
2 Cancer	538,947
3 Cerebrovascular disease (stroke)	158,060
4 COPD and allied conditions	114,381
5 Pneumonia and influenza	94,828
6 Accidents	93,207
7 Diabetes	64,574
8 Suicide	29,264
9 Nephritis	26,295
10 Chronic liver disease	24,936
All other causes of death	469,314

* Includes 460,390 deaths from coronary heart disease.

In 1998, heart disease, stroke, and COPD were the first, third, and fourth leading causes of death, respectively.[28]

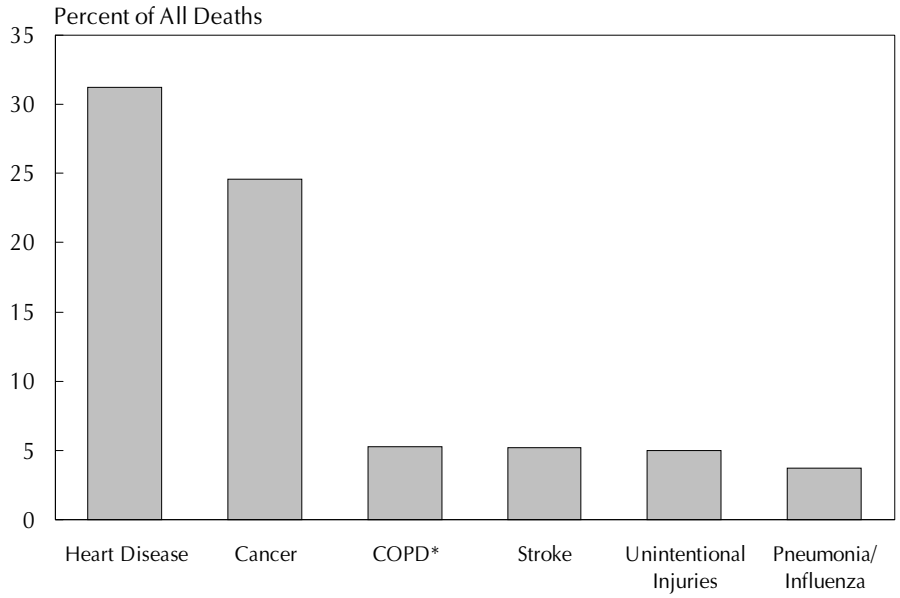
Chart 2-9
Leading Causes of Death by Age and Rank, U.S., 1998

Cause of Death	1-24	25-44	45-64	65-84	85+
Heart disease	5	3	2	1	1
Cancer	4	2	1	2	2
Cerebrovascular disease	9	8	4	3	3
Accidents	1	1	3	7	8
COPD*	8	—	5	4	5
Pneumonia and influenza	7	10	9	5	4
Diabetes mellitus	—	9	6	6	7
Suicide	3	4	8	—	—
Chronic liver disease	—	7	7	—	—
Atherosclerosis	—	—	—	—	10
Nephritis and nephrosis	—	—	—	8	9
Homicide	2	6	—	—	—
Septicemia	—	—	—	9	—
HIV infection	10	5	10	—	—
Congenital anomalies	6	—	—	—	—
Alzheimer's disease	—	—	—	10	6

* COPD and allied conditions.

In 1998, heart disease was the third leading cause of death for those age 25-44, second for those age 45-64, and first for older age groups. Stroke ranked fourth highest in those age 45-64 and third highest in those age 65+. COPD ranked fourth or fifth highest in those age 45+.[29]

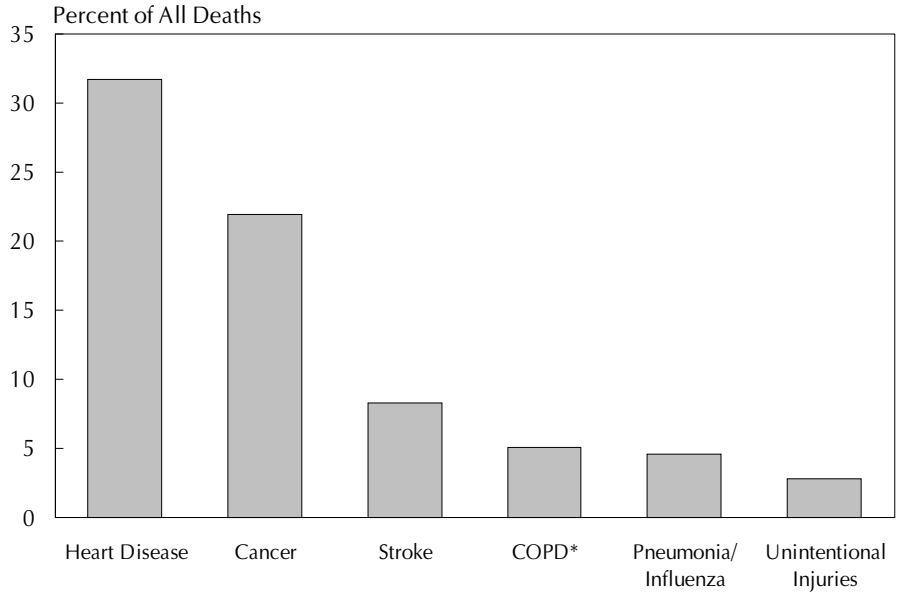
Chart 2-10
Leading Causes of Death,
White Males, U.S., 1998



In 1998, among white males, heart disease, COPD, and stroke were the first, third, and fourth leading causes of death, respectively.[29]

* COPD and allied conditions.

Chart 2-11
Leading Causes of Death,
White Females, U.S., 1998

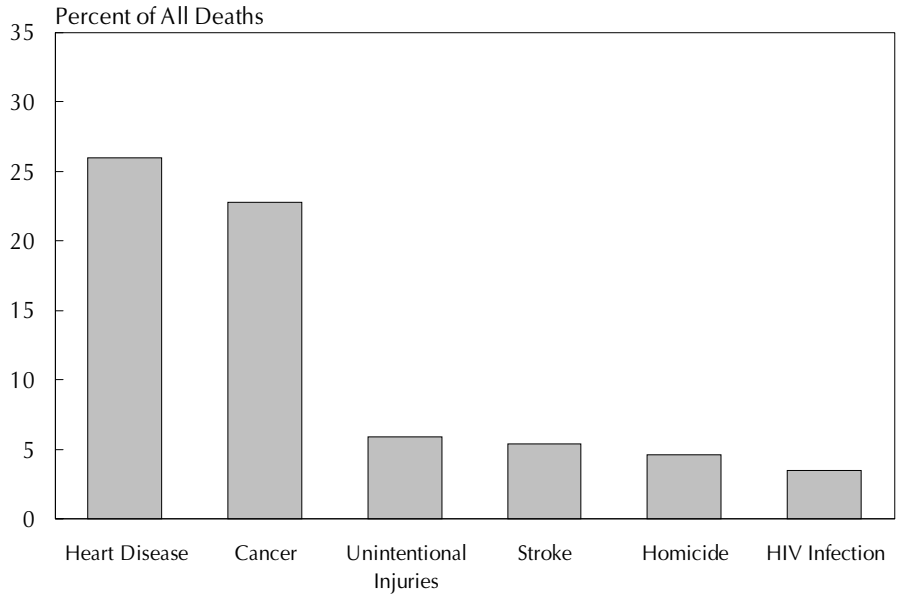


In 1998, among white females, heart disease, stroke, and COPD were the first, third, and fourth leading causes of death, respectively.[29]

* COPD and allied conditions.

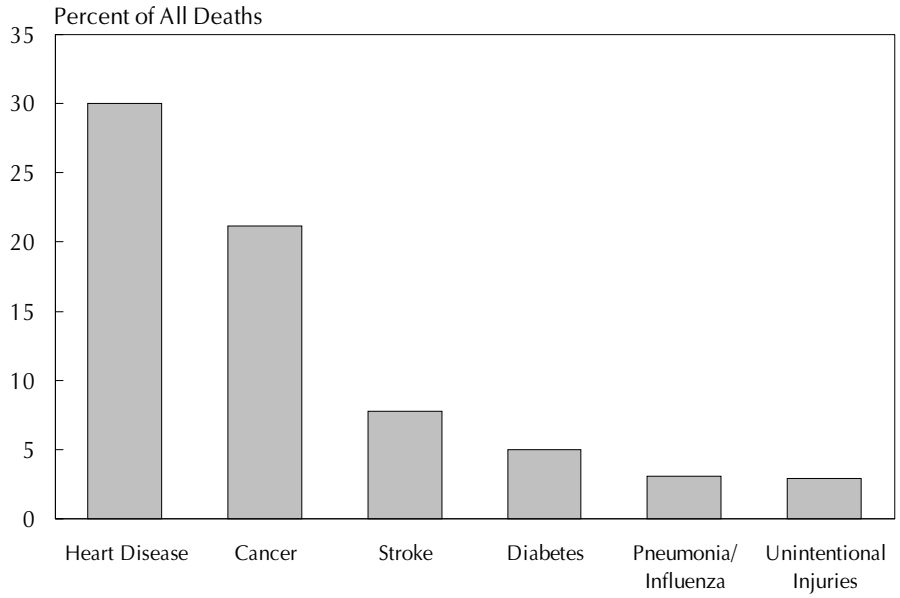
Background Data

Chart 2-12
Leading Causes of Death,
Black Males, U.S., 1998



In 1998, among black males, heart disease and stroke were the first and fourth leading causes of death, respectively.[29]

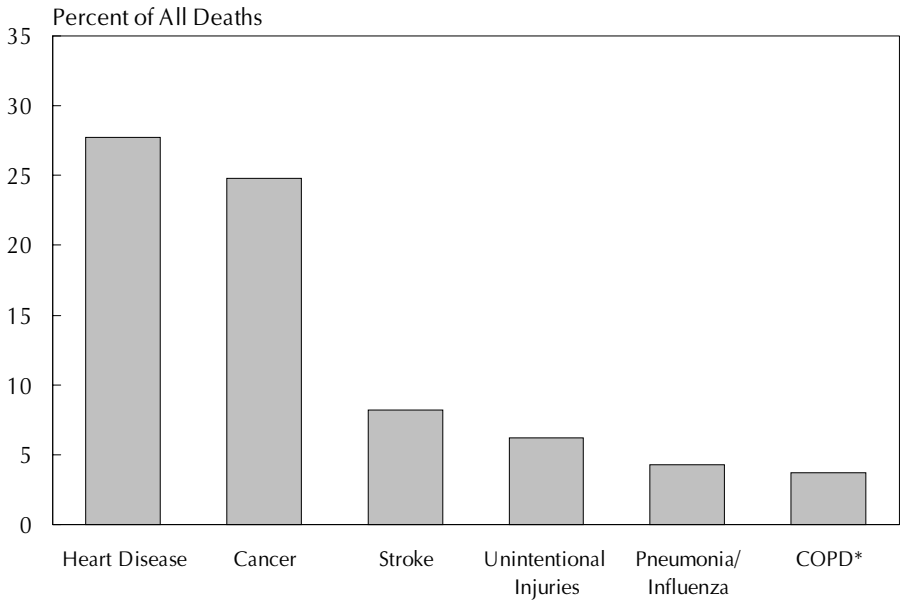
Chart 2-13
Leading Causes of Death,
Black Females, U.S., 1998



In 1998, among black females, heart disease and stroke were the first and third leading causes of death, respectively.[29]

Background Data

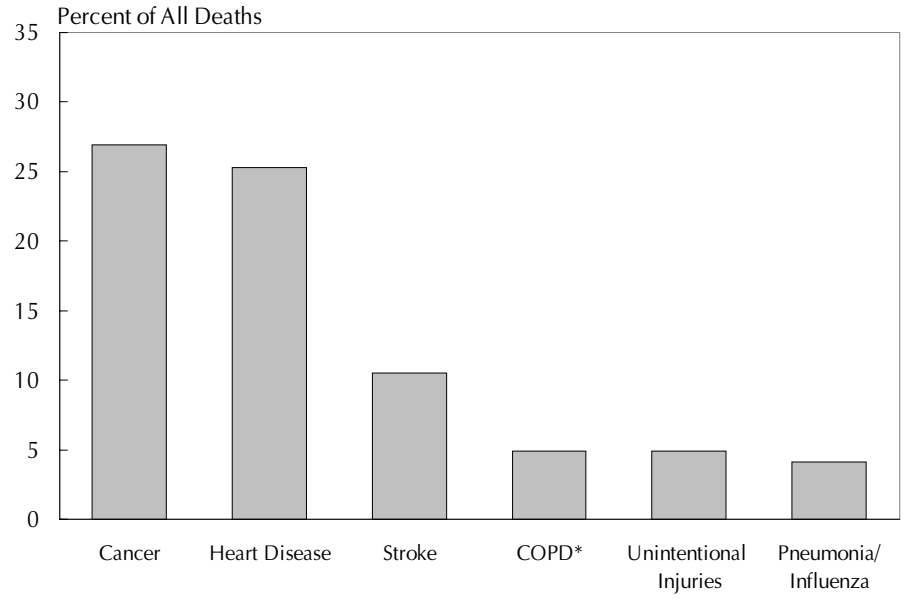
Chart 2-14
Leading Causes of Death,
Asian Males, U.S., 1997



In 1997, among Asian males, heart disease, stroke, and COPD were the first, third, and sixth leading causes of death, respectively.[12]

* COPD and allied conditions.

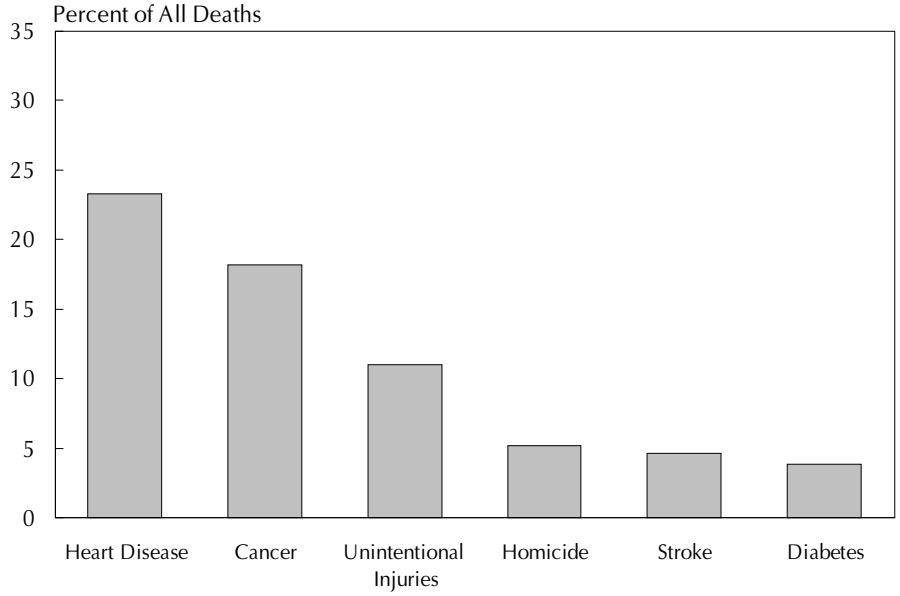
Chart 2-15
Leading Causes of Death,
Asian Females, U.S., 1997



In 1997, among Asian females, heart disease, stroke, and COPD were the second, third, and fourth leading causes of death, respectively.[12]

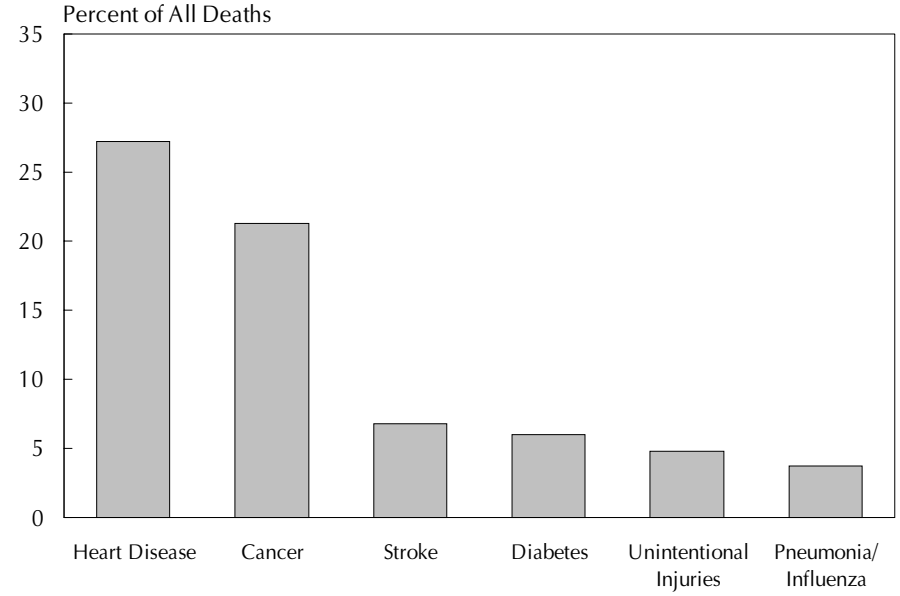
* COPD and allied conditions.

Chart 2-16
Leading Causes of Death,
Hispanic Males, U.S., 1997



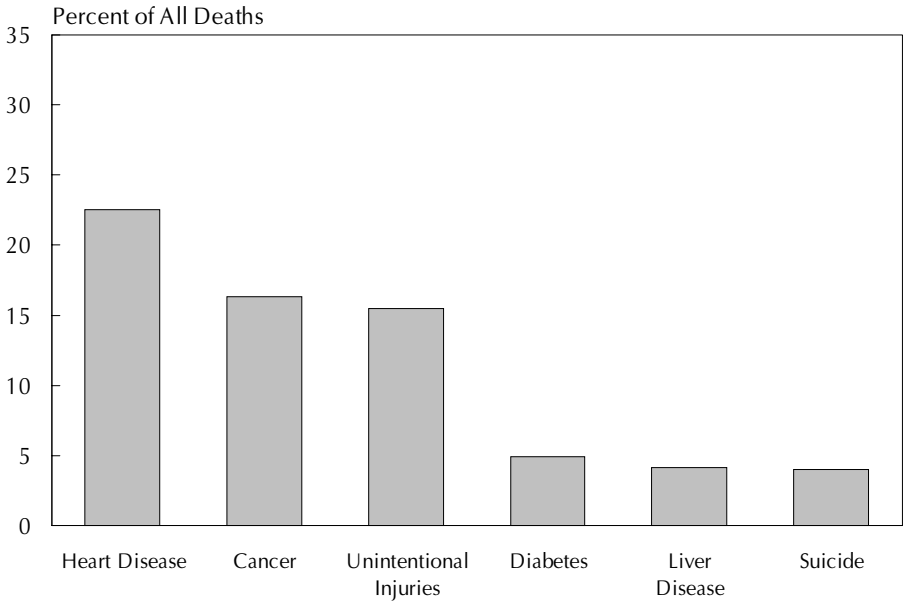
In 1997, among Hispanic males, heart disease and stroke were the first and fifth leading causes of death, respectively.[12]

Chart 2-17
Leading Causes of Death,
Hispanic Females, U.S., 1997



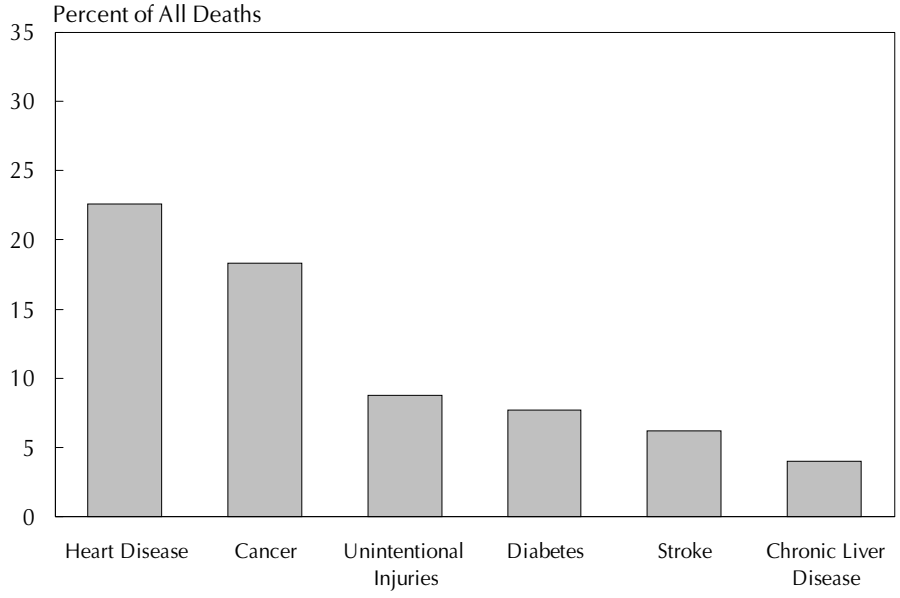
In 1997, among Hispanic females, heart disease and stroke were the first and third leading causes of death, respectively.[12]

Chart 2-18
Leading Causes of Death,
American Indian Males, U.S., 1997



In 1997, heart disease was the leading cause of death among American Indian males.[12]

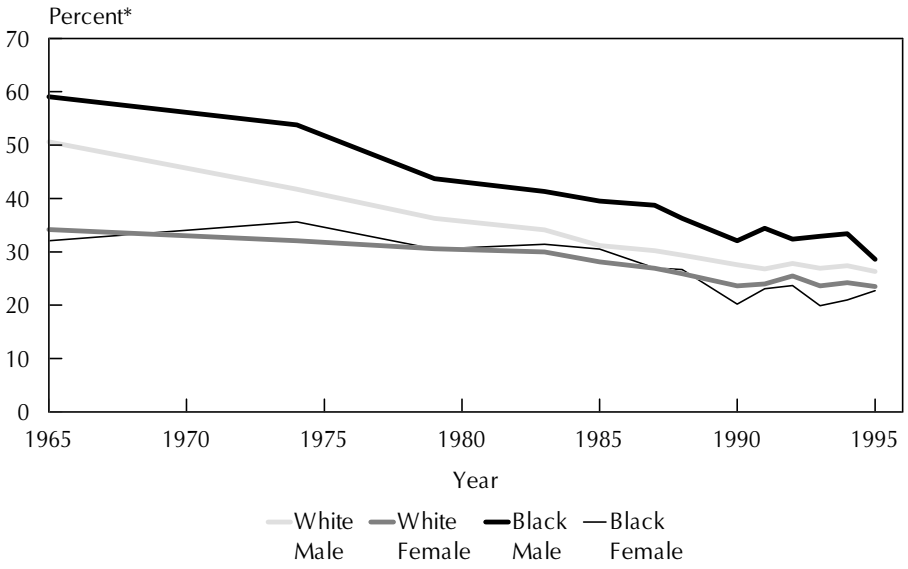
Chart 2-19
Leading Causes of Death,
American Indian Females, U.S., 1997



In 1997, among American Indian females, heart disease and stroke were the first and fifth leading causes of death, respectively.[12]

Background Data

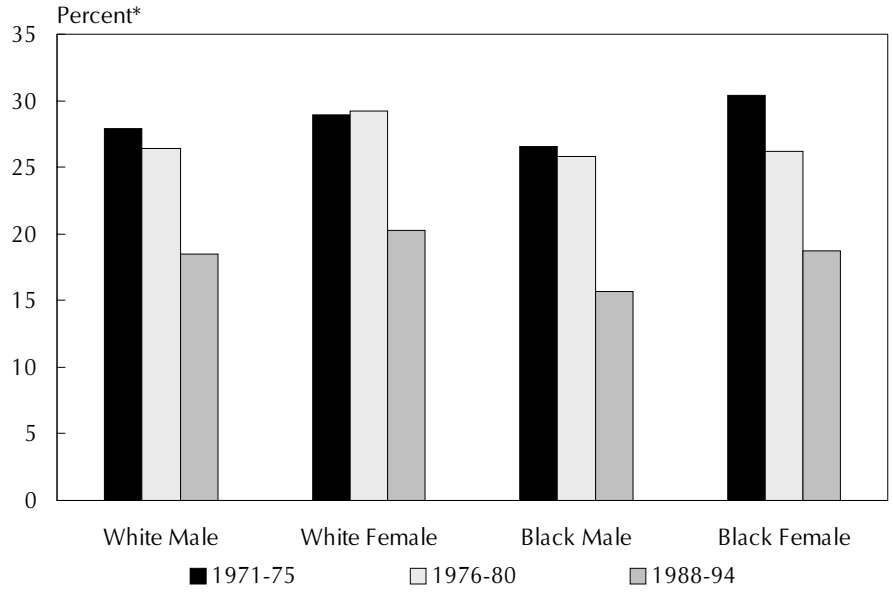
Chart 2-20
Percent of Population Currently Smoking by Race and Sex, Age 18+, U.S., 1965-1995



In 1995, the percent of adults age 18+ who smoked cigarettes was 26% for white males, 29% for black males, 23% for white females, and 23% for black females. Declines since 1965 have been much steeper in males than in females.[12]

* Age-adjusted to the 2000 standard.

Chart 2-21
Percent of Population With High Serum Cholesterol by Race and Sex, Age 20-74+, U.S., 1971-75 to 1988-94

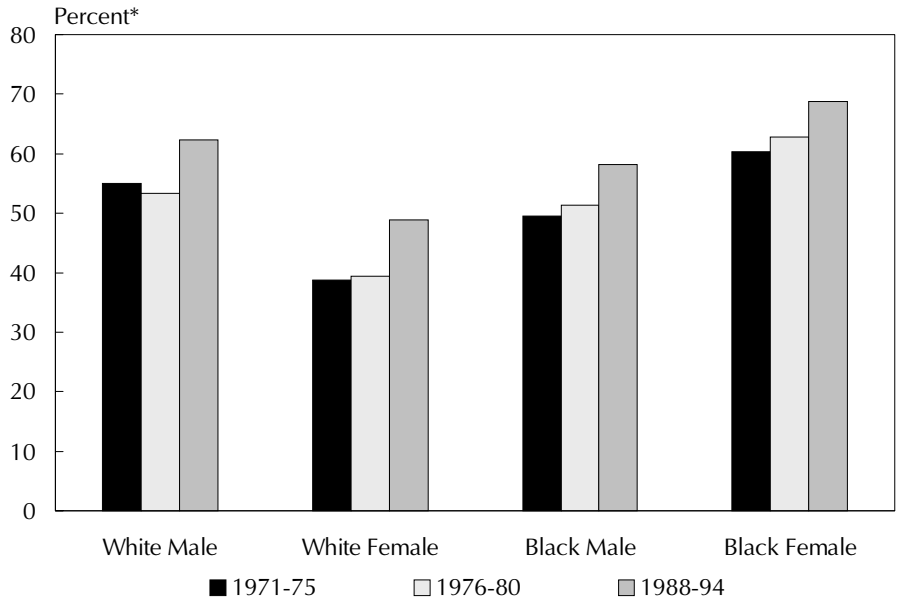


Prevalence of high total serum cholesterol declined in white and in black males and females between 1971-75 and 1988-94.[12]

* Age-adjusted to the 2000 standard.
Note: High serum cholesterol is 240+ mg/dL.

Background Data

Chart 2-22
Percent of Population That Is Overweight, U.S., 1971-75 to 1988-94



For each sex-race group, the prevalence of overweight males and females increased between 1976-80 and 1988-94.[12]

* Age-adjusted to the 2000 standard.
Note: Overweight is body mass index of 25 kg/m^2 or greater.

Chart 2-23
Economic Cost of Cardiovascular, Lung, and Blood Diseases in Billions of Dollars, U.S., 2000

Disease	Total	Direct	Morbidity	Mortality
Total CVD	326.6	185.8	27.6	113.2
Heart disease	214.7	105.9	17.2	91.6
Coronary	118.2	55.2	7.2	55.8
CHF	22.5	20.3	*	2.2
Stroke	51.3	30.6	5.6	15.1
Hypertensive disease†	37.2	26.1	5.2	5.9
Selected lung disease	137.9	91.6	22.8	23.5
COPD	30.4	14.7	6.5	9.2
Asthma	12.7	8.1	2.6	2.0
Selected blood disease	11.2	8.8	0.6	1.8
Anemias	5.6	4.2	0.5	0.9

* No estimate made for indirect morbidity costs.
† Most costs for hypertensive disease are included in total heart disease.
Note: Direct costs are expenditures for hospital care, physician and other professional care, home care, nursing home care, and drugs. Indirect morbidity costs represent lost earnings due to illness. Indirect mortality costs represent lost future earnings by those who died from the given disease in 1997.

Annual expenditures for health and lost productivity due to cardiovascular, lung, and blood diseases cost the Nation billions of dollars. These estimates were made by the NHLBI primarily using mortality and health survey data from the NCHS, health expenditure data from the HCFA, and income data from the U.S. Bureau of the Census. Costs for these diseases as secondary causes of morbidity and mortality were not included.[22, 30-37]

3. Cardiovascular Diseases

In this chapter, the diagnostic group *cardiovascular diseases* (CVD) is used to mean diseases of the circulatory system as coded in the ICD. Charts show morbidity and mortality data for total heart disease, coronary heart disease (CHD), congestive heart failure (CHF), cardiomyopathy, atrial fibrillation, hypertension, cerebrovascular diseases, and diseases of arteries. Congenital anomalies of the circulatory system have also been included here even though this term is found in a separate chapter of the ICD.

Chart 3-4 contains a list of selected CVD along with the ninth revision ICD codes. It also includes 1997 estimates of hospital discharges, durations of stay, physician office visits, and deaths for these diagnostic categories. The terminology used is modified from the exact ICD terminology listed in Appendix A. Subsequent graphs and tables display morbidity and mortality for most of the following CVD.

Forty-eight percent of all CVD deaths in 1998 were due to CHD, 16.7 percent to stroke, and 4.5 percent to other diseases of the arteries (Chart 3-1). Thus, about 70 percent of all CVD deaths were atherosclerotic-related.

Heart Disease

Many forms of heart disease exist; as a disease category, "heart disease" is the number one cause of death and a common cause of morbidity. Mortality and morbidity statistics are provided to show trends among specific groups (racial/ethnic, sex) and by geographic location. Because heart disease includes hypertensive and rheumatic heart diseases, both of which have long been declining as causes of death, the rise in mortality from total heart disease in the 1940s and 1950s was modest compared with the significant increase for its major component, CHD.

Coronary Heart Disease

CHD accounts for almost two-thirds of all heart disease deaths (Chart 3-2). However, identifying CHD as the underlying cause of death is sometimes difficult because the diagnostic information available at the time of death can be insufficient to distinguish accurately among the numerous forms of heart disease. In addition, over the years, multiple revisions of the ICD have led to changes in the codes for the various forms of heart disease. As a result, discontinuities in trends exist in mortality data (Chart 3-24) that compare CHD death rates among racial/ethnic and sex groups.

The "AMI" classification is a useful category for hospitalization and physician office visit statistics and for prevalence, but less so for mortality. Because the subgroup "angina pectoris" is a notoriously poor diagnostic category in standard morbidity and mortality statistics, its presentation here is limited.

Congestive Heart Failure

CHF is a sequela of various heart diseases. It is a heart "condition," not a heart "disease," and is more common as a contributing rather than an underlying cause of death. Thus, it is not precise to classify CHF as an underlying cause of death. The condition, however, is increasingly prevalent and common in hospitalizations and mortality reporting. It is marked by an extraordinarily poor prognosis. Hospitalization and mortality for CHF have increased (until very recently), while mortality for total heart diseases has declined.

Cardiomyopathy

In 1997, more than 28,000 deaths were attributed to cardiomyopathy even though no consensus exists on classification and diagnostic criteria for the disease. It is assumed that this limitation has little effect on any mortality differences influenced by age, race, or sex.

Atrial Fibrillation and Other Heart Diseases

The number of patients hospitalized with atrial fibrillation has been increasing, but the number of deaths attributed to this disorder is not known

because the diagnostic information on the death certificate is inadequate. Diseases of pulmonary circulation, acute and subacute endocarditis, and cardiac dysrhythmias are a few of the other heart diseases of interest, but measures of their morbidity, and especially their mortality, are of uncertain quality. Therefore, no charts pertaining to them have been included.

Hypertensive Disease

Prevalence and trend data on awareness, treatment, and control of hypertension are important statistics associated with hypertension morbidity. Mortality statistics are not presented for hypertensive disease because it is not a distinct underlying cause of death. In fact, its presence on death certificates is often arbitrary, and its selection as the underlying cause of death is often characterized by a lack of good diagnostic information at the time of death. However, where death rates for hypertensive disease have been presented, the trends have been markedly downward.

Cerebrovascular Diseases (Stroke)

Cerebrovascular disease, i.e., stroke, is the third leading cause of death. Only a small proportion of deaths from stroke can be classified as cerebral hemorrhage, occlusion, thrombosis, or embolism. Most are coded to ill-defined forms of cerebrovascular disease (Chart 3-3). Thus, mortality for the entire category is presented.

Diseases of Arteries

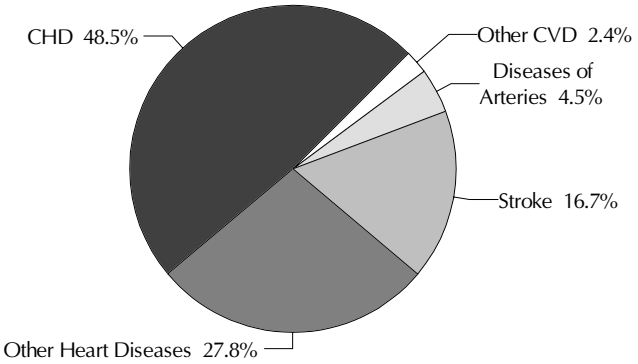
The ICD term "diseases of arteries" is used to refer to peripheral vascular disease and includes a variety of atherosclerotic disorders; none of them specifically involves the heart or brain. Examples are aortic aneurysm, atherosclerosis of the extremities, arterial embolism and thrombosis, and generalized atherosclerosis. Hospital, physician visit, and mortality data are presented, but valid prevalence estimates are not available.

Congenital Anomalies of the Circulatory System

The ICD term "congenital anomalies of the circulatory system" includes congenital heart disease. Because most deaths in this disease category occur in infants younger than 1 year of age, the preferred mortality tabulation is the infant mortality rate.

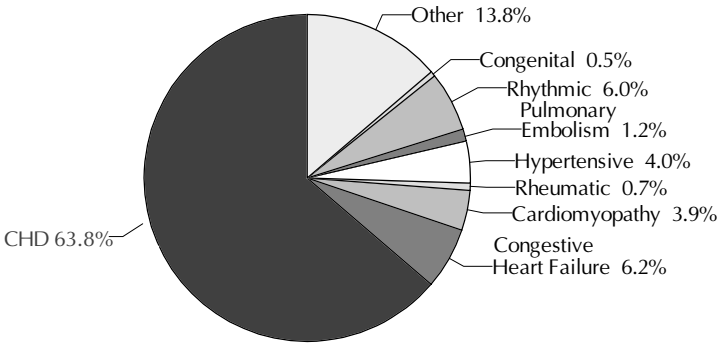
Cardiovascular Diseases

Chart 3-1
Cardiovascular Disease Deaths,
Percent* by Subgroup, U.S., 1998



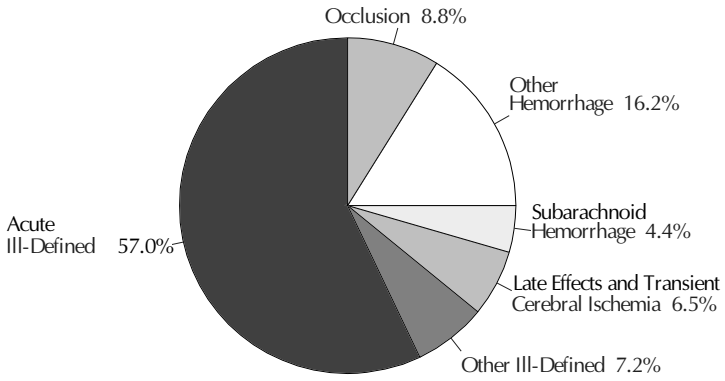
Total Deaths = 948,572 (100%), including congenital cardiovascular disease, ICD/9 codes 745–747.

Chart 3-2
Heart Disease Deaths,
Percent* by Subgroup, U.S., 1997



Total Deaths = 730,674 (100%), including 3,700 from congenital heart disease, ICD/9 codes 745-746.

Chart 3-3
Stroke Deaths,
Percent* by Subgroup, U.S., 1997



Total Deaths = 159,791 (100%)

* Numbers may not add to 100% due to rounding.

Cardiovascular Diseases

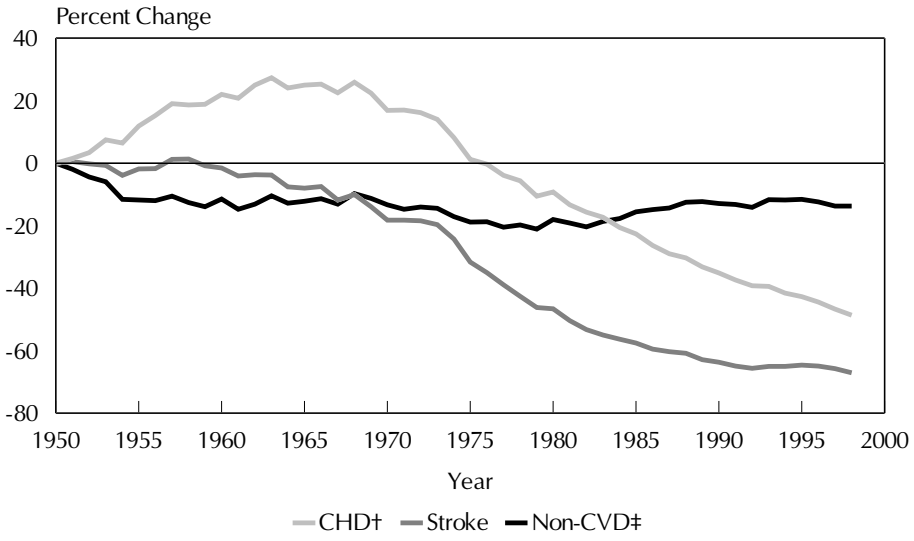
Chart 3-4
Number of Hospitalizations, Physician Office Visits, and Deaths for Cardiovascular Diseases, U.S., 1997

Diagnostic Category	ICD/9 Codes	Hospitalizations: First-Listed Discharge (000)	Hospitalizations: Length of Stay (Days)	Physician Office Visits (000)	Deaths
Total CVD	390-459, 745-747	6,145	5.3	60,442	953,110
Heart disease	390-398, 402, 404-429	4,188	5.1	19,632	726,974
Rheumatic heart disease	390-398	35	7.3	270	5,014
Hypertensive heart disease	402, 404	126	5.2	726	29,031
Coronary heart disease	410-414	2,090	4.8	10,678	466,101
Acute myocardial infarction	410	756	6.0	261	206,212
Angina pectoris	413	97	2.5	1,083	735
Other CHD	411, 412, 414	1,237	4.2	9,333	259,154
Diseases of pulmonary circulation	415-417	87	6.6	104	12,002
Pulmonary embolism	415.1	71	6.9	90	8,596
Other	415.0, 416-417	16	5.4	34	3,406
Acute and subacute endocarditis	421	17	11.8	18	981
Cardiomyopathy	425	39	6.7	651	28,190
Congestive heart failure	428.0	957	5.8	2,763	45,419
Atrial fibrillation	427.31	319	4.5	1,215	6,486
Other arrhythmias	426, 427 (except 427.31)	378	4.1	1,788	38,503
Other heart diseases	420, 422-424, 428.1, 428.9, 429	140	5.8	1,419	95,257
Other hypertensive diseases	401, 403	296	4.2	29,958	13,534
Cerebrovascular diseases	430-438	1,018	5.8	1,684	159,791
Diseases of arteries	440-448	304	7.2	2,640	43,849
Atherosclerosis	440	114	7.3	110	16,057
Aortic aneurysm	441	71	8.6	213	16,724
Other diseases of arteries	442-448	119	6.3	2,317	11,068
Diseases of veins	451-459	285	5.6	6,015	4,264
Deep vein thrombosis	451.1	22	6.4	0	681
Other diseases of veins	451.0, 451.2-459	263	5.5	6,015	3,583
Congenital anomalies of the circulatory system	745-747	48	7.8	244	4,698
Congenital heart disease	745-746	35	8.0	187	3,700
Other congenital anomalies of the circulatory system	747	13	7.4	57	998

Note: Estimates of hospitalizations and physician office visits are subject to sampling variability. Estimates of hospitalizations below 50,000 have a relative standard error of more than 11 percent. Estimates of physician office visits below 588,000 have a relative standard error of more than 30 percent. Compiled from references 15, 34-35.

Cardiovascular Diseases

Chart 3-5
Change in Age-Adjusted Death Rates*
Since 1950, U.S., 1950-1998



The CHD death rate increased 27% from its level in 1950 to a peak in 1963. By 1998, it was 49% lower than in 1950. The rate for stroke declined in most years so that by 1998 it was 67% lower than in 1950. The death rate for the non-cardiovascular causes of death was only 14% lower in 1998 than in 1950.[15, 22, 29]

* Age-adjusted to the 2000 standard.
† Comparability ratio applied to rates for years 1968-1978.
‡ Total mortality minus CVD (excluding congenital).

Chart 3-6
Age-Adjusted Death Rates* and Percent Change for All Causes and Cardiovascular Diseases, U.S., 1963 and 1998

Cause of Death	Deaths/100,000 Pop. 1963	1998	1963-1998 Difference	Percent Change	% Contribution to Total Decline
All causes	1346.3	876.2	-470.1	-34.9	100
CVD†	805.4	354.9	-450.5	-55.9	96
CHD	429.1	173.0	-256.1	-59.7	54
Stroke	173.9	59.5	-114.4	-65.8	24
Other CVD	202.4	122.4	-80.0	-39.5	17
Non-CVD	540.9	521.3	-19.6	-19.6	4

* Age-adjusted to the 2000 standard.
† Excludes congenital anomalies of the circulatory system.

Between 1963 and 1998, the CVD death rate declined 56% compared with 20% for all non-CVD causes of death. Ninety-six percent of the total mortality decrease was due to the decline in CVD. CHD and stroke mortality declined 60% and 66%, respectively.[15, 22, 29]

Cardiovascular Diseases

Chart 3-7
Average Annual Percent Change in Age-Adjusted Death Rates* for All Causes and Cardiovascular Diseases, U.S., 1965-1998

Period	All Causes	Total CVD†	CHD‡	Stroke	Other CVD	All Other Causes
1965-1970	-1.1	-1.9	-1.1	-2.2	-3.4	-0.1
1970-1975	-2.0	-2.7	-2.7	-3.2	-2.2	-1.2
1975-1980	-1.4	-2.4	-2.5	-5.2	-0.1	-0.1
1980-1985	-0.9	-2.4	-3.0	-4.4	+0.1	+0.6
1985-1990	-1.0	-2.9	-3.4	-3.0	-2.2	+0.8
1990-1995	-0.3	-1.3	-2.3	-0.3	-0.1	+0.5
1995-1998	-1.6	-2.6	-3.6	-2.3	-1.2	-0.9

* Age-adjusted to the 2000 standard.
† Excludes congenital anomalies of the circulatory system.
‡ Comparability ratio applied to rates for 1968-1978.

Declines in CVD mortality continue. Average annual percent declines between 1995 and 1998 are 2.6% for CVD, 3.6% for CHD, and 2.3% for stroke.[15, 22, 29]

Chart 3-8
Average Annual Percent Change in Age-Adjusted Death Rates* for All Causes and Cardiovascular Diseases by Race and Sex, U.S., 1990-1998

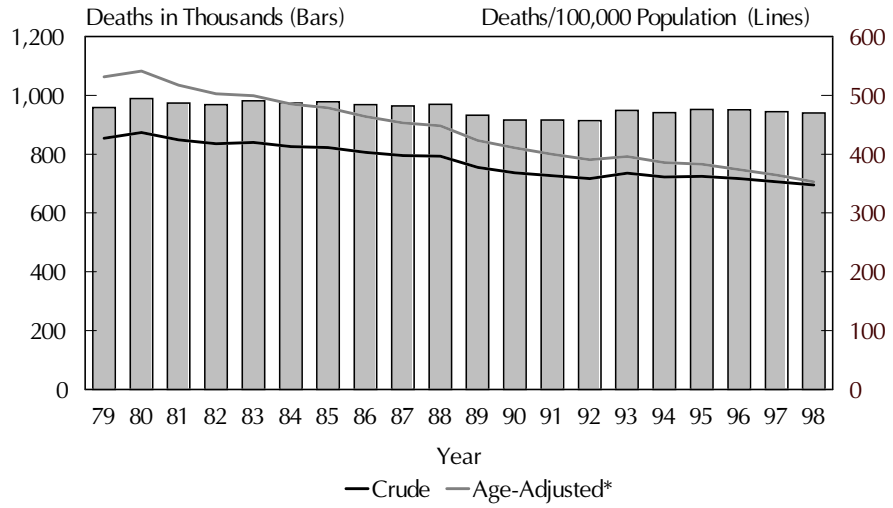
	Total	White Male	White Female	Black Male	Black Female
All causes	-0.7	-1.3	0.0	-1.9	-0.5
CVD†	-1.7	-2.2	-1.3	-2.1	-1.4
Heart disease	-1.9	-2.4	-1.6	-2.4	-1.9
Coronary	-2.7	-3.1	-2.5	-2.7	-1.9
CHF†	+1.8	+1.6	+2.3	-0.6	+0.4
Stroke	-0.7	-1.0	-0.3	-2.0	-1.1
All non-CVD†	0.0	-0.6	+0.9	-1.8	+0.1

* Age-adjusted to the 2000 standard.
† 1990-1997.

Between 1990 and 1998, declines in CVD, CHD, and stroke mortality were greater in males than in females. For CHD, they were greater in whites than in blacks. For stroke, they were greater in blacks than in whites. Declines were greater for CHD than for stroke.[15, 22, 29]

Cardiovascular Diseases

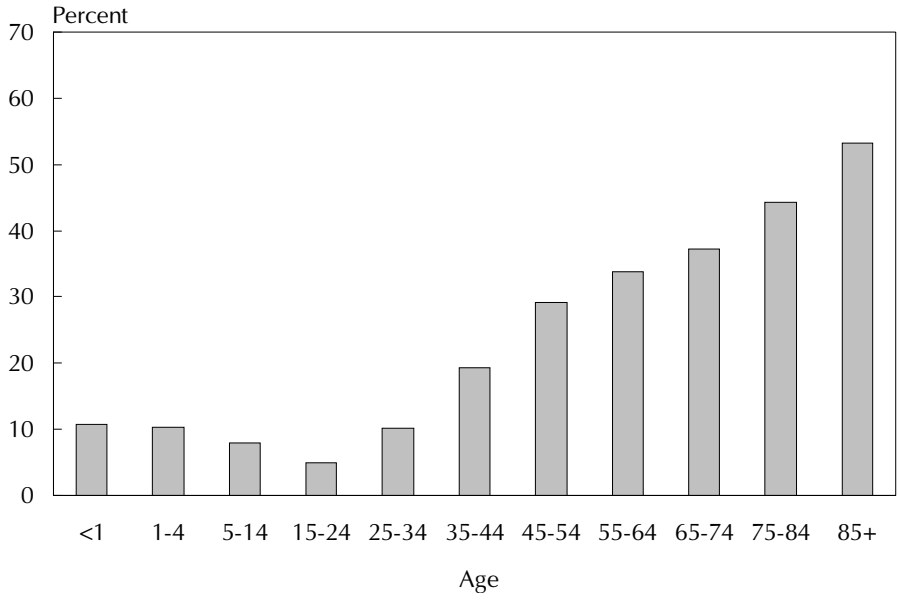
Chart 3-9
Deaths and Death Rates for Major Cardiovascular Diseases, U.S., 1979-1998



CVD death rates, crude and adjusted, declined considerably between 1979 and 1998, despite only a very modest decline in the total number of CVD deaths.[15, 22, 29]

* Age-adjusted to the 2000 standard.
Note: ICD codes 390-448. Total CVD would include about 10,000 more deaths.

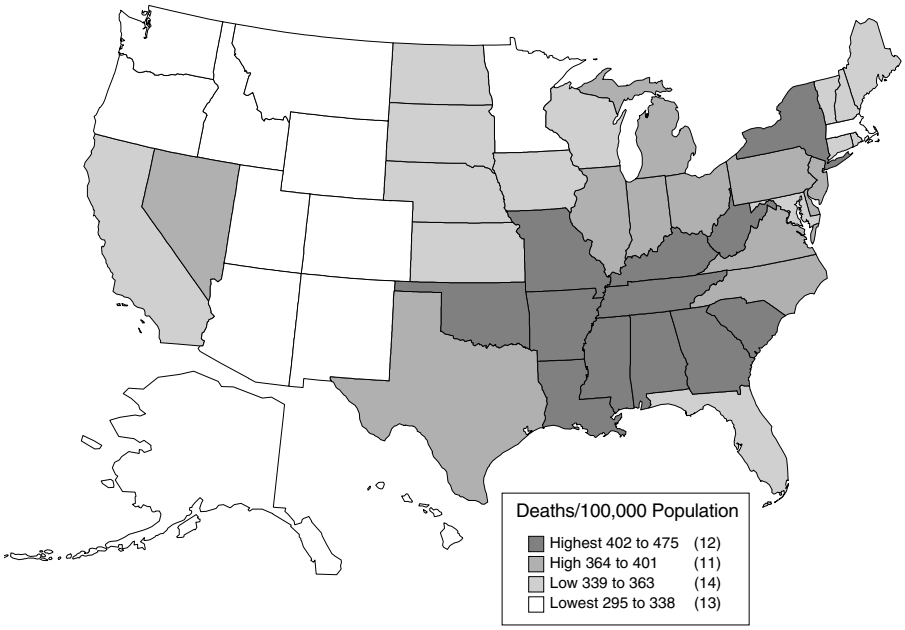
Chart 3-10
Percent of All Deaths Due to Cardiovascular Diseases by Age, U.S., 1998



The percentage of all deaths due to CVD increases with age among adults. It is 19% at age 35-44 and 53% at age 85+.[15, 22, 29]

Cardiovascular Diseases

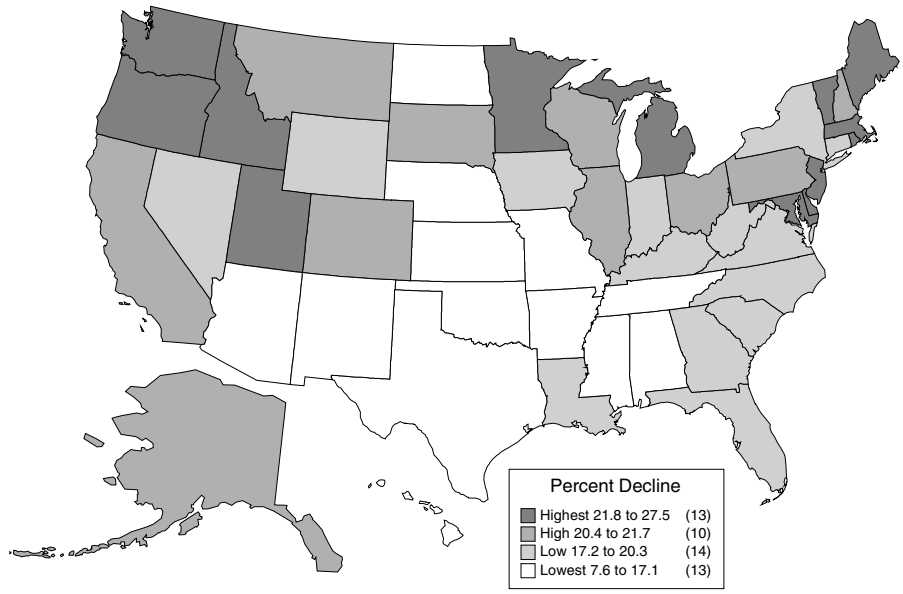
Chart 3-11
Age-Adjusted Death Rates* for Cardiovascular Diseases by State, U.S., 1995-1997



* Age-adjusted to the 2000 standard.

Highest CVD death rates tend to be in the East and the lowest in the West.[15]

Chart 3-12
Percent Decline in Age-Adjusted Death Rates* for Cardiovascular Diseases by State, U.S., 1985-87 to 1995-97

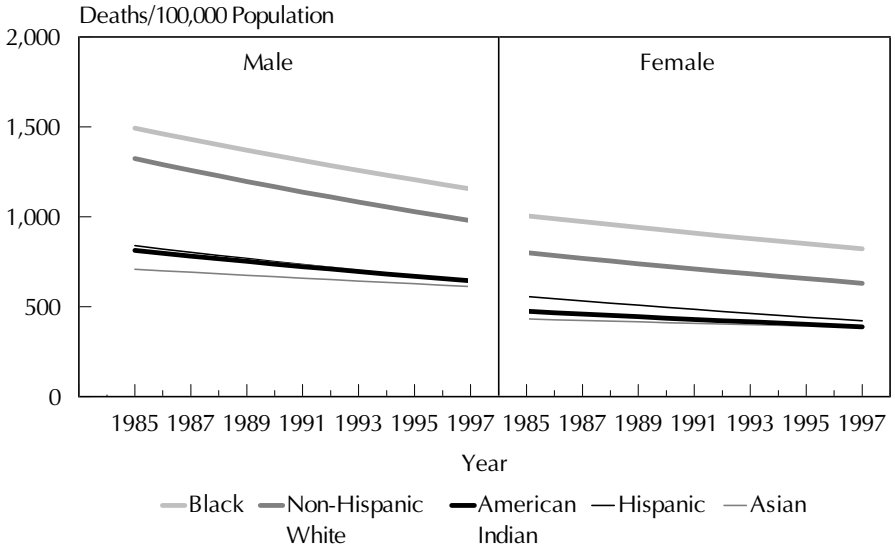


* Age-adjusted to the 2000 standard.

Between 1985-87 and 1995-97, the smallest average annual percent declines in CVD death rates tended to be in the South.[15]

Total Heart Disease

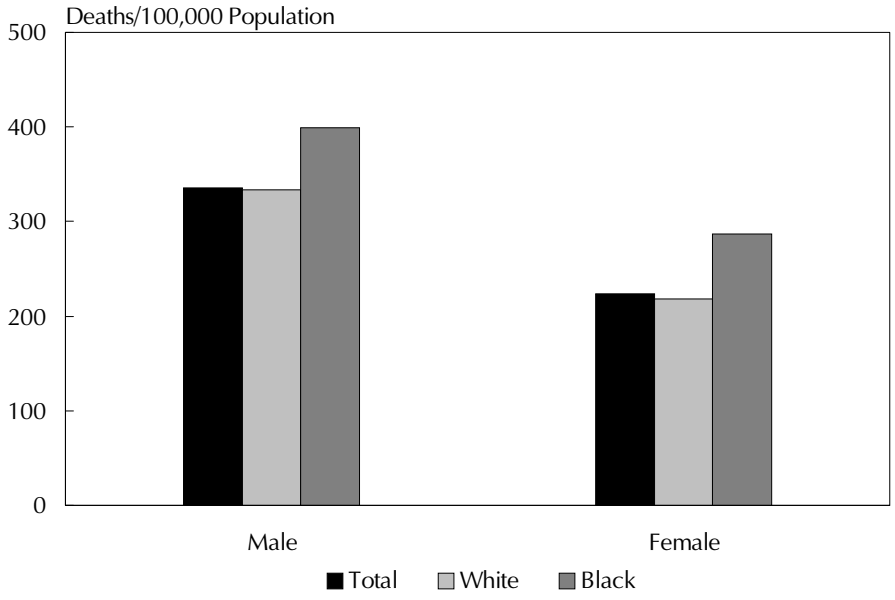
Chart 3-13
Age-Adjusted Death Rates* for Heart Disease
by Race/Ethnicity and Sex, Age 45+, U.S., 1985-1997



Between 1985 and 1997, heart disease death rates for males and females, age 45+, declined in blacks, whites, American Indians, and Hispanics. It declined much less in Asians.[12]

* Age-adjusted to the 2000 standard.
Note: Each line is a log linear regression derived from the actual rates.

Chart 3-14
Age-Adjusted Death Rates* for Heart Disease
by Race and Sex, U.S., 1998

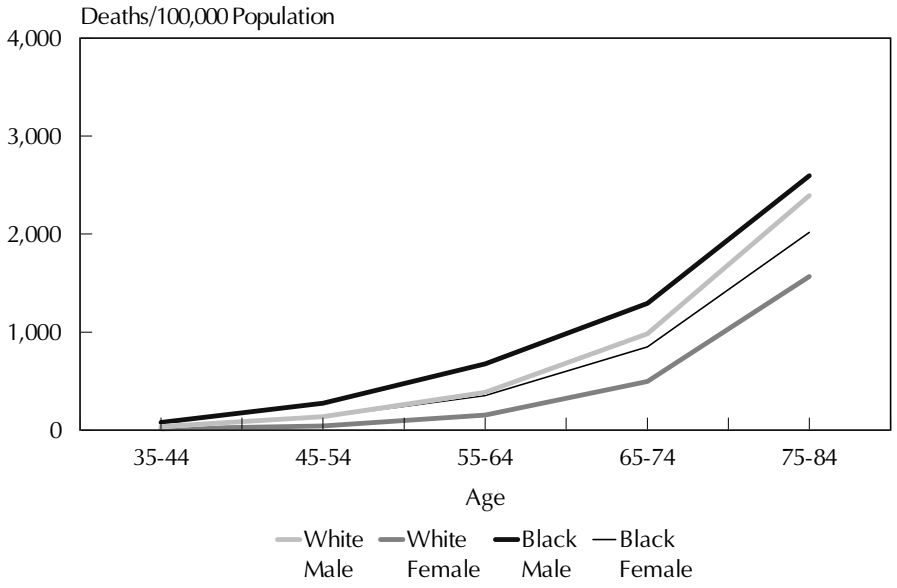


Heart disease mortality is 20% higher in black males than in white males, 31% higher in black females than in white females, and 50% higher in males than in females.[29]

* Age-adjusted to the 2000 standard.

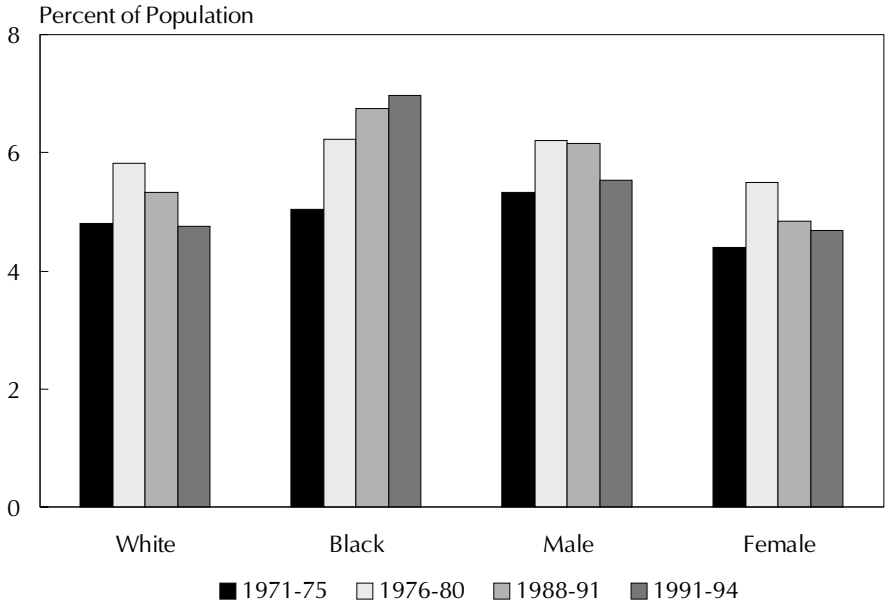
Total Heart Disease

Chart 3-15
Death Rates for Heart Disease by Age, Race, and Sex, U.S., 1998



Heart disease death rates are higher in black males than in white males and in black females than in white females at all ages from 35 to 84.[29]

Chart 3-16
Prevalence* of Coronary Heart Disease by Race and Sex, Age 25-74, U.S., 1971-75 to 1991-94

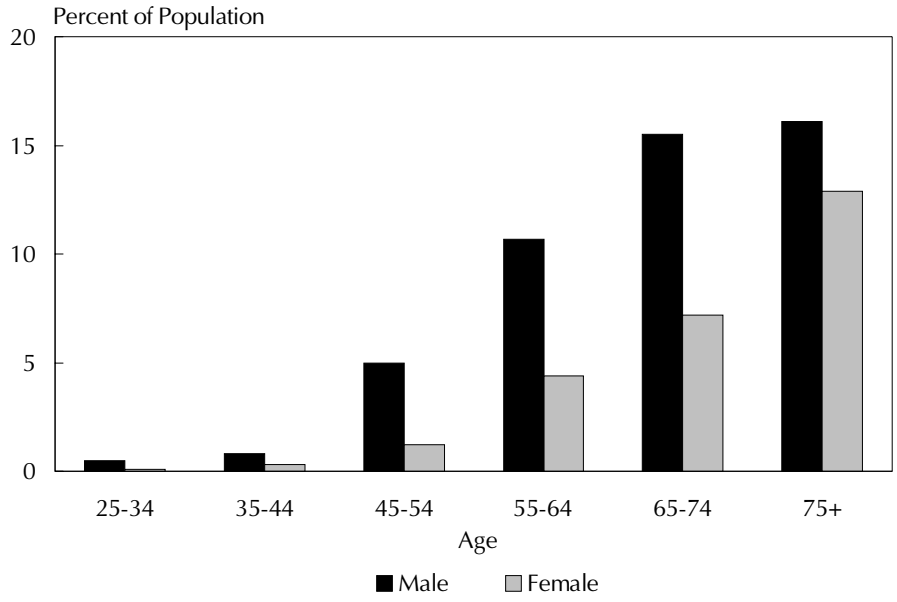


* Age-adjusted to the 2000 standard.

The prevalence of CHD increased in blacks between 1971-75 and 1991-94 and decreased in males, females, and whites between 1976-80 and 1991-94.[18]

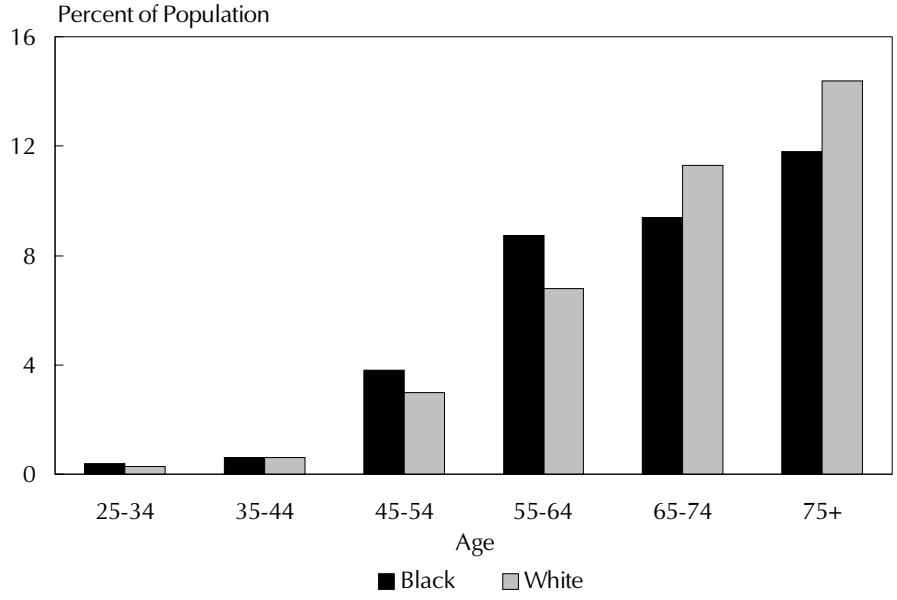
Coronary Heart Disease

Chart 3-17
Prevalence of Acute Myocardial Infarction by Age and Sex, U.S., 1988-1994



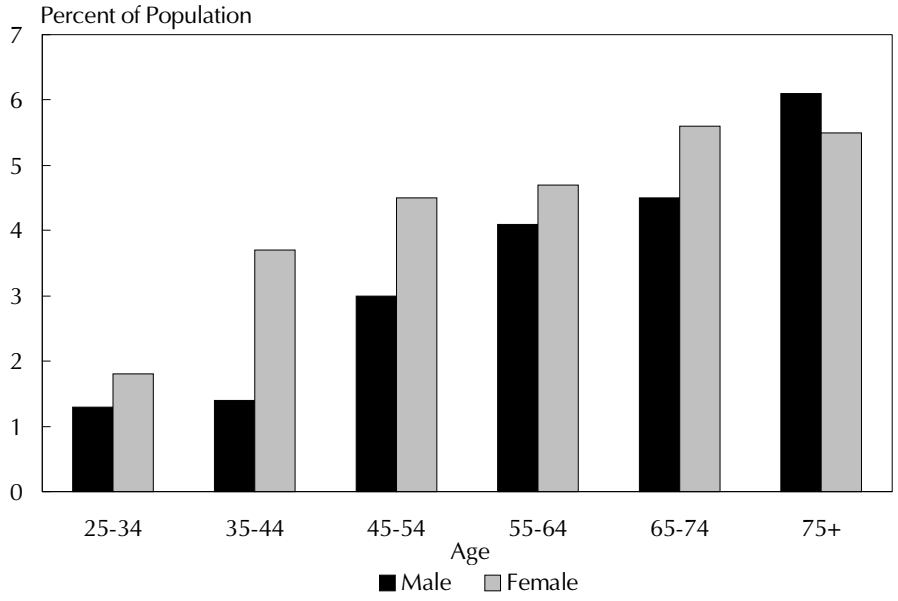
The prevalence of AMI is higher in males than in females at all ages.[18]

Chart 3-18
Prevalence of Acute Myocardial Infarction by Age and Race, U.S., 1988-1994



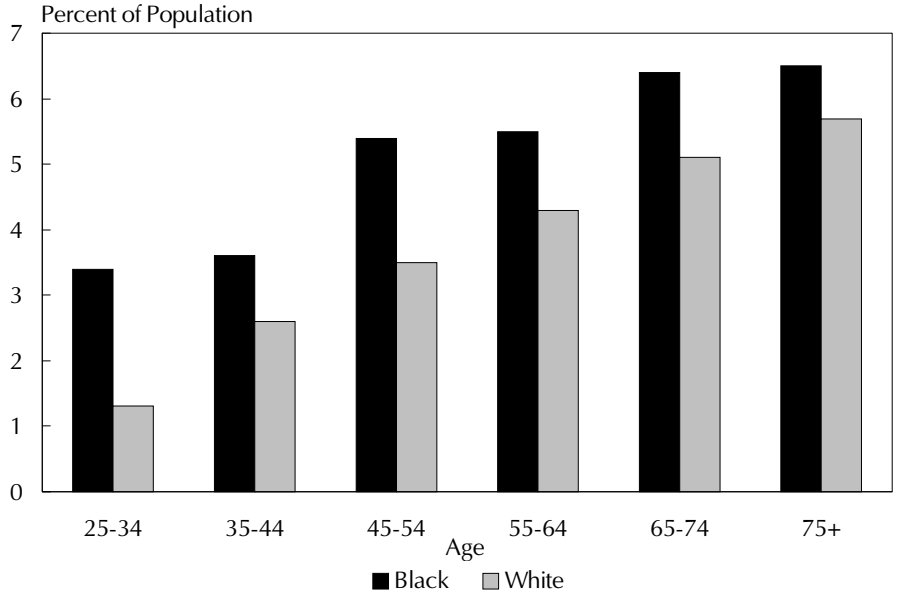
The prevalence of AMI is greater in blacks at younger ages and greater in whites at ages 65 and over.[18]

Chart 3-19
Prevalence of Angina Pectoris
by Age and Sex, U.S., 1988-1994



The prevalence of angina pectoris is greater in females than males between ages 25 and 74, after which it is greater in males.[18]

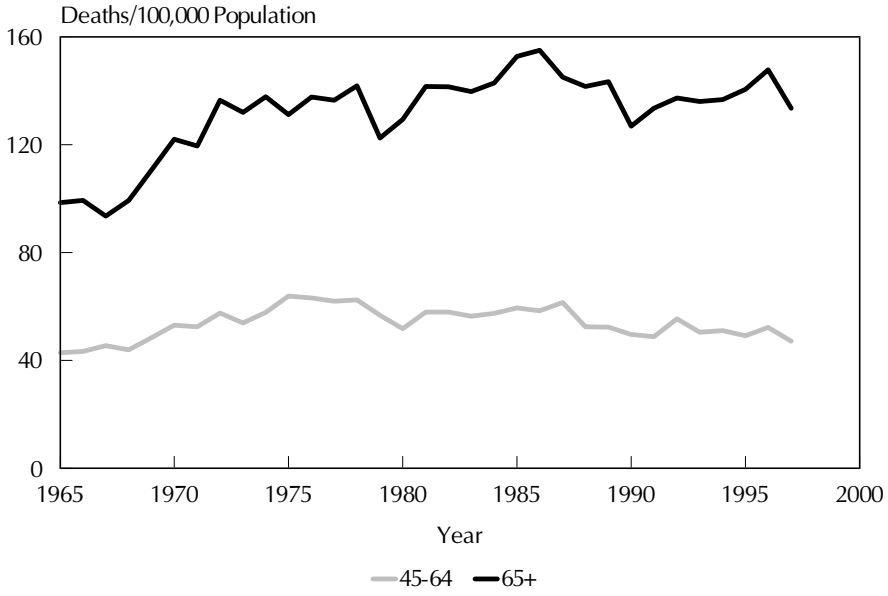
Chart 3-20
Prevalence of Angina Pectoris
by Age and Race, U.S., 1988-1994



The prevalence of angina pectoris is greater in blacks than in whites older than age 25.[18]

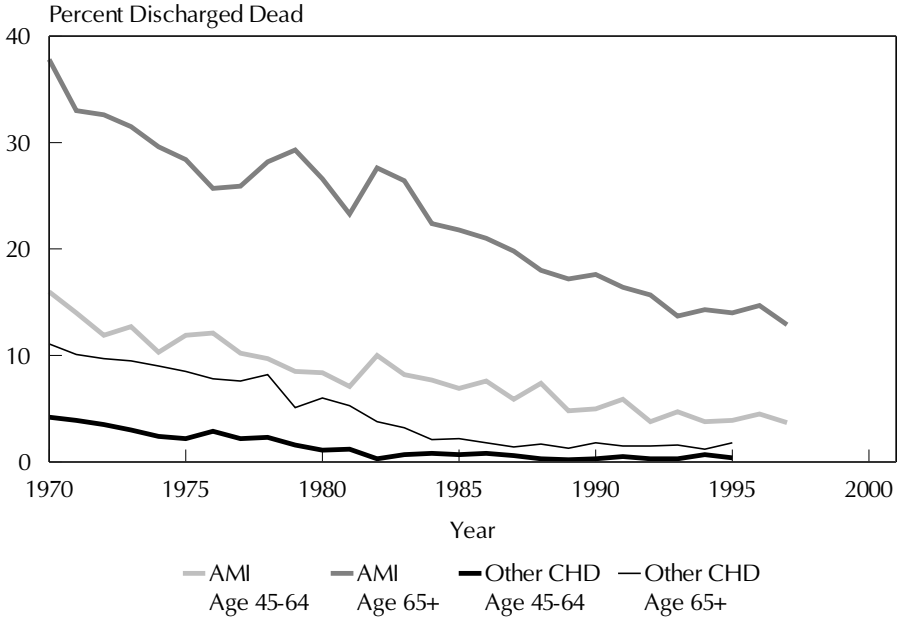
Coronary Heart Disease

Chart 3-21
Hospitalization Rates for Acute Myocardial Infarction, Age 45-64 and 65+, U.S., 1965-1997



The AMI hospitalization rate at age 45-64 increased between 1965 and the mid-1970s. It declined modestly between 1987 and 1997. For age 65+, the rate increased between 1965 and 1985 and then appears to have stabilized.[38]

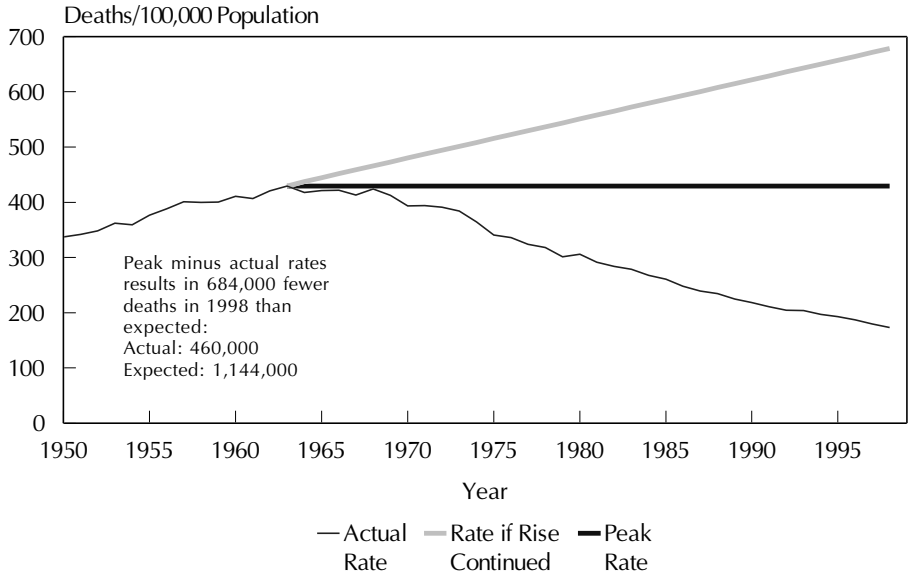
Chart 3-22
Hospital Case-Fatality Rates for Acute Myocardial Infarction and Other Coronary Heart Diseases, Age 45-64 and 65+, U.S., 1970-1997



Between 1970 and 1997, CHD hospital case-fatality rates declined substantially, especially for those age 65+.[38]

Coronary Heart Disease

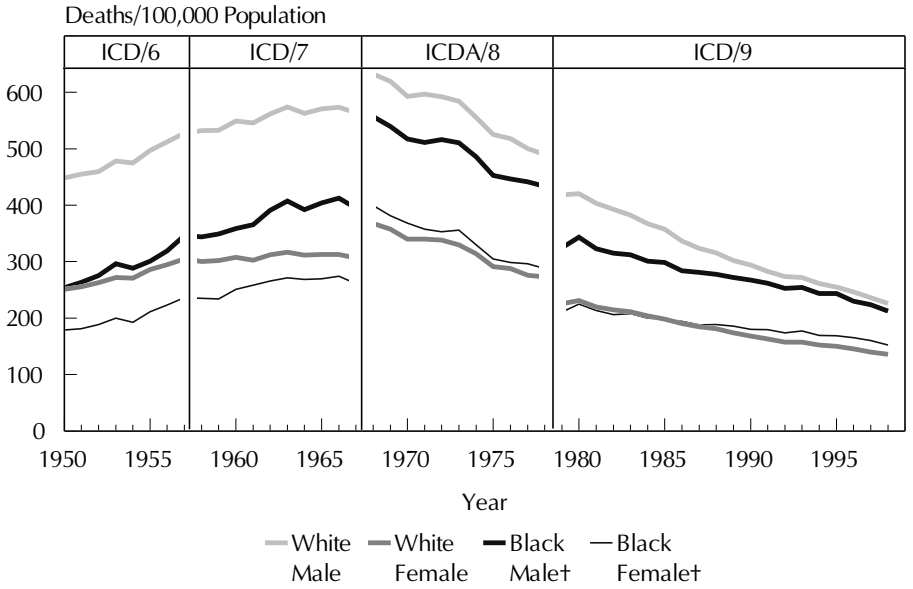
Chart 3-23
Age-Adjusted Death Rates* for Coronary Heart Disease, Actual and Expected, U.S., 1950-1998



CHD accounted for 460,000 deaths in 1998. It would have accounted for 1,144,000 if the rate had remained at its 1963 peak.[8, 15, 22, 29]

* Age-adjusted to the 2000 standard.
Note: Comparability ratio applied to rates for 1968-1978.

Chart 3-24
Age-Adjusted Death Rates* for Coronary Heart Disease by Race and Sex, U.S., 1950-1998

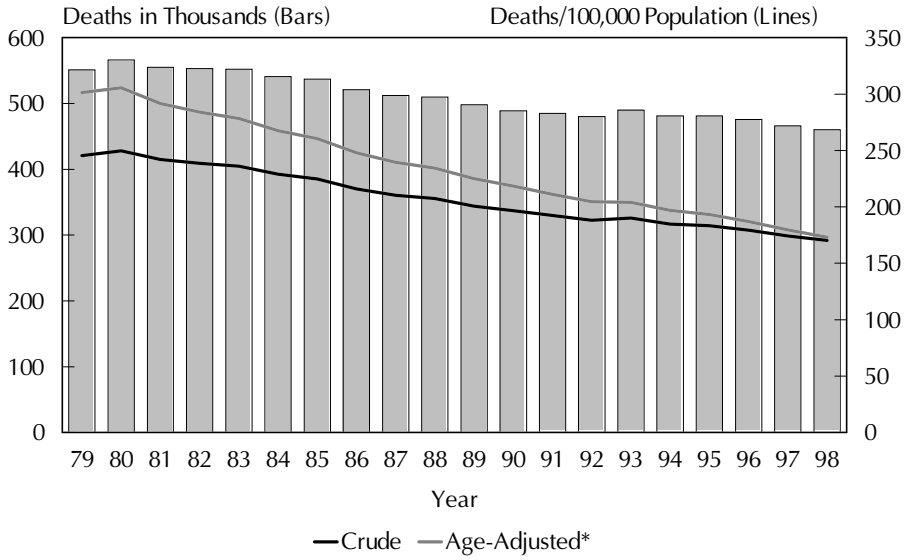


CHD death rates initially increased and then decreased for each race-sex group between 1950 and 1998. The white-black gap for males has narrowed due to a steeper decline in mortality in white males.[15, 22, 29]

* Age-adjusted to the 2000 standard.
†Nonwhite from 1950 to 1967.

Coronary Heart Disease

Chart 3-25
Deaths and Death Rates for Coronary Heart Disease, U.S., 1979-1998



* Age-adjusted to the 2000 standard.

Since 1980, the crude and age-adjusted death rates and the number of deaths for CHD have decreased almost every year.[15, 22, 29]

Chart 3-26
Average Annual Percent Change in Age-Adjusted Death Rates* for Coronary Heart Disease by Race and Sex, U.S., 1963-1998

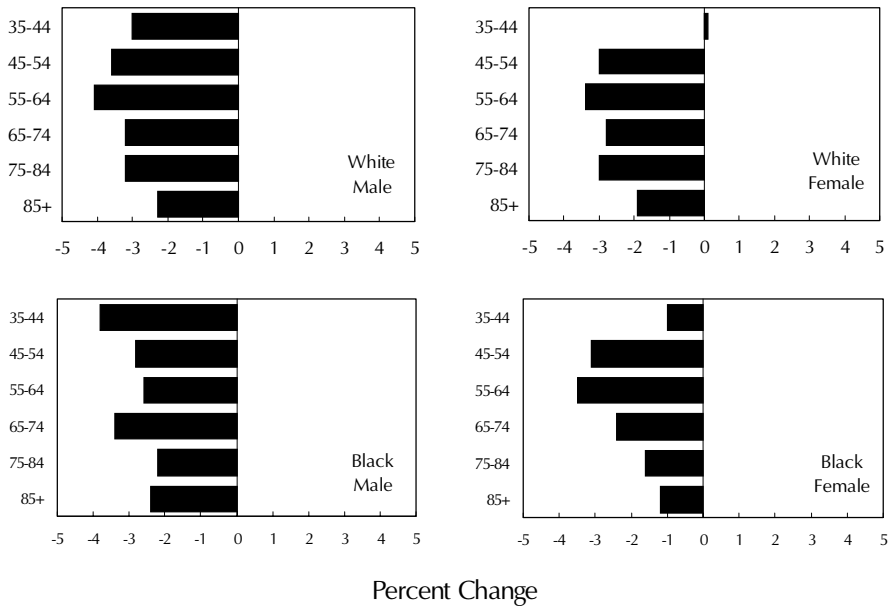
Period	Total Pop.	White Male	White Female	Black Male	Black Female
1963-1967	-0.7	-0.2	-0.6	-0.1	-0.6
1968-1978	-2.9	-2.6	-3.1	-2.5	-3.3
1979-1990	-3.1	-3.4	-2.8	-2.1	-1.7
1990-1995	-2.3	-2.7	-2.2	-1.9	-1.4
1995-1998	-3.6	-3.9	-3.3	-4.2	-3.4

* Age-adjusted to the 2000 standard.

In the 1980s and early 1990s, white males and females experienced steeper declines in CHD mortality than black males and females. However, between 1995 and 1998, the declines were greater for black males than for white males, but fairly similar for black and white females.[15, 22, 29]

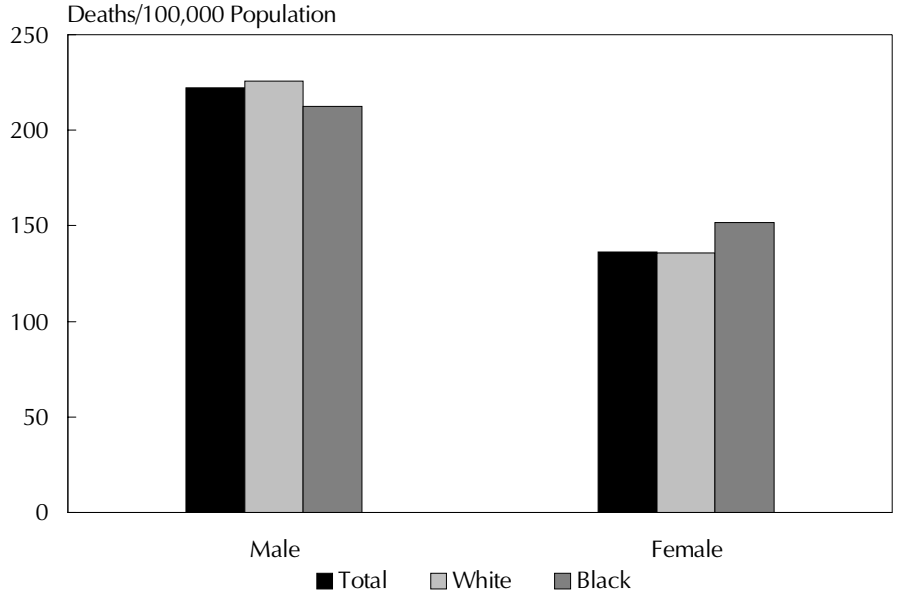
Coronary Heart Disease

Chart 3-27
Average Annual Percent Change in Death Rates for Coronary Heart Disease by Age, Race, and Sex, U.S., 1990-1998



Between 1990 and 1998, the average annual percent declines in CHD mortality after age 55 tended to decrease with age for white males, white females, and black females.[15, 22, 29]

Chart 3-28
Age-Adjusted Death Rates* for Coronary Heart Disease by Race and Sex, U.S., 1998

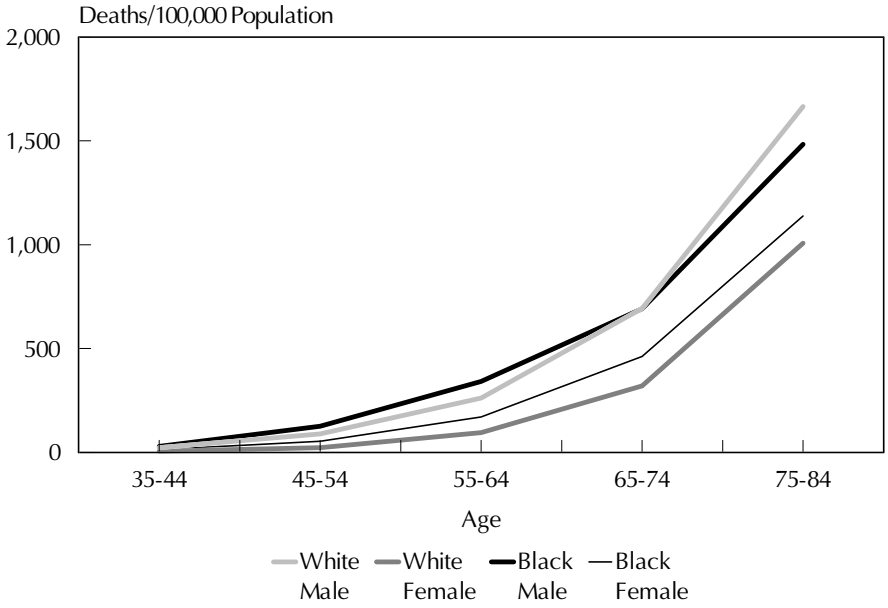


CHD mortality is slightly higher in white males than in black males, slightly higher in black females than in white females, and considerably higher in males than in females.[29]

* Age-adjusted to the 2000 standard.

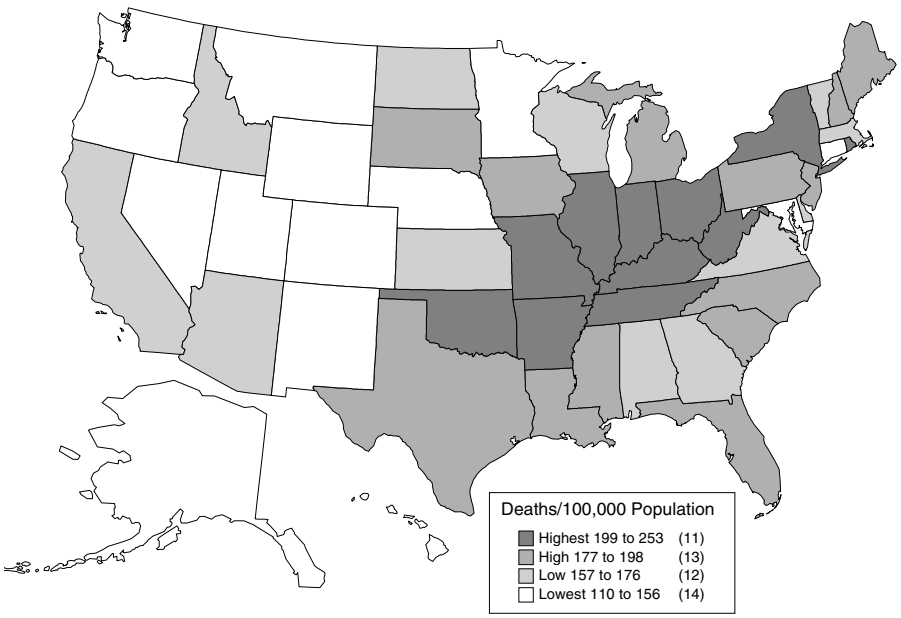
Coronary Heart Disease

Chart 3-29
Death Rates for Coronary Heart Disease by Age, Race, and Sex, U.S., 1998



In 1998, CHD mortality was higher in black females than in white females between age 35 and 84 and was higher in black males than in white males between age 35 and 64. Death rates were higher in males than in females.[29]

Chart 3-30
Age-Adjusted Death Rates* for Coronary Heart Disease by State, U.S., 1995-1997

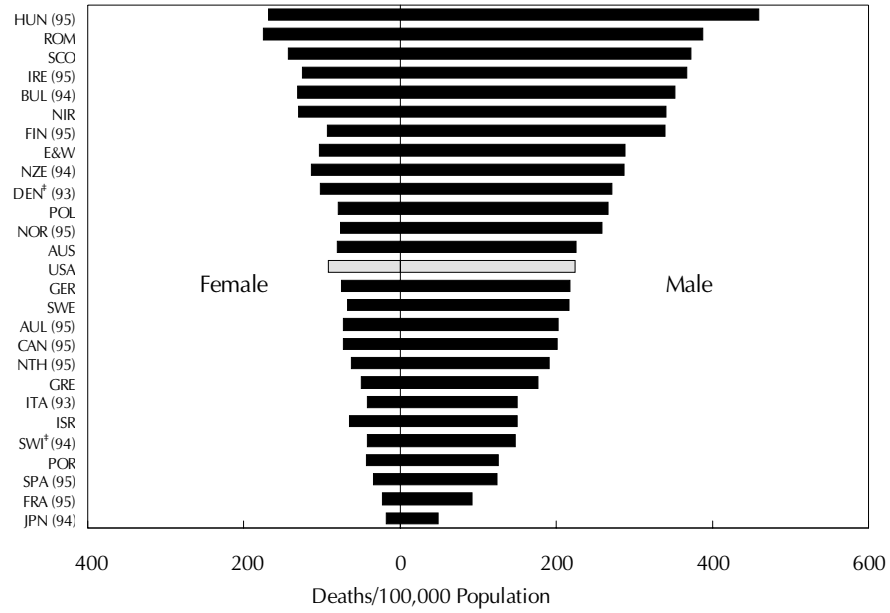


High CHD death rates are in a narrow band of states from New York through Appalachia to Oklahoma. Many western mountain states have low rates.[15]

* Age-adjusted to the 2000 standard.

Coronary Heart Disease

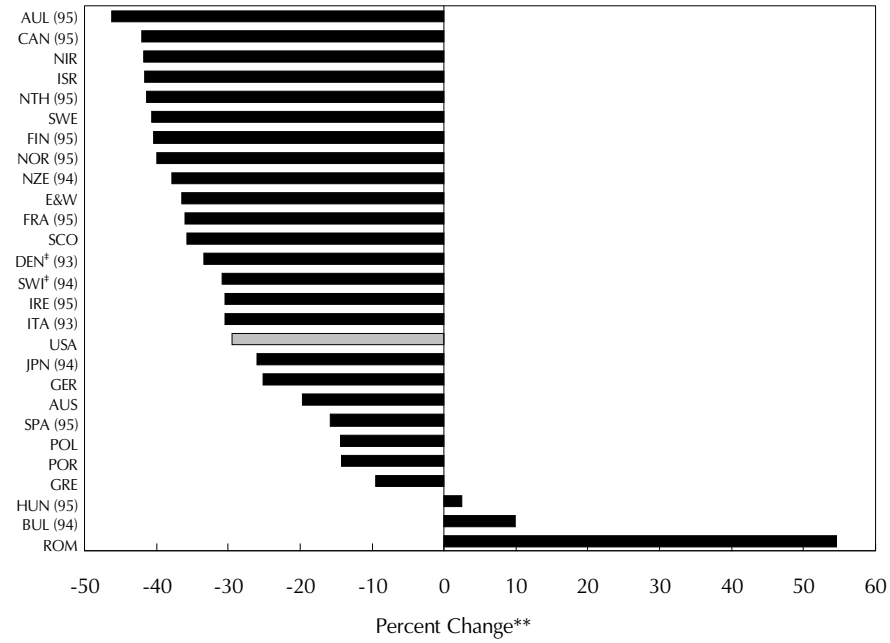
Chart 3-31
Age-Adjusted Death Rates* for Coronary Heart Disease by Country and Sex, Age 35-74, 1996†



Among 27 industrialized countries, the United States ranks 14th for CHD mortality in males and 11th in females. Not shown are rates for the Russian Federation: 736.9 in males and 254.6 in females.[11, 22]

* Age-adjusted to the European standard.
† Data for 1996 unless otherwise noted in parentheses.
‡ Eighth revision of the ICD.

Chart 3-32
Change in Age-Adjusted Death Rates* for Coronary Heart Disease in Males by Country, Age 35-74, 1986-1996†

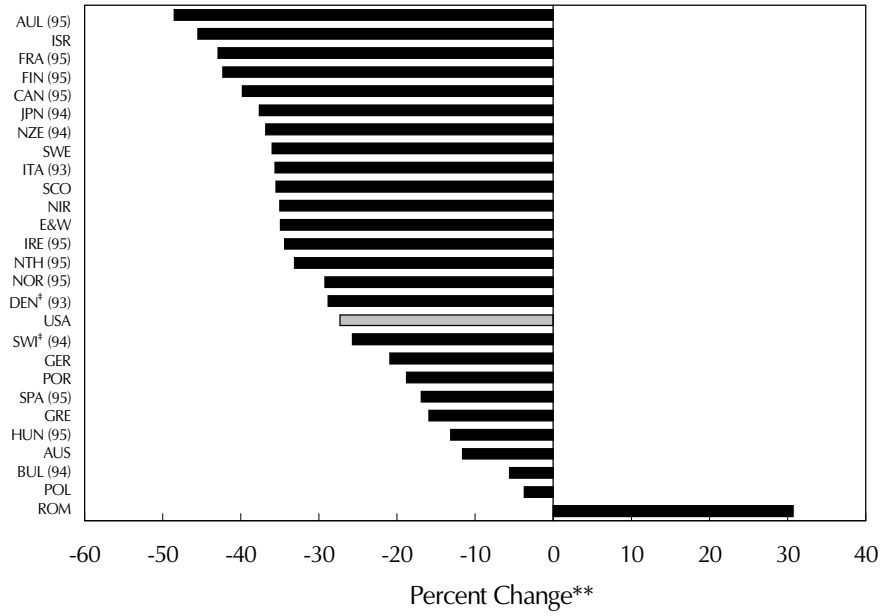


Between 1986 and 1996, 16 countries had a steeper decline in CHD mortality in males than the U.S.[11, 22]

* Age-adjusted to the European standard.
** Based on a log linear regression of the actual rates.
† Data for 1996 unless otherwise noted in parentheses.
‡ Eighth revision of the ICD.

Coronary Heart Disease/Congestive Heart Failure

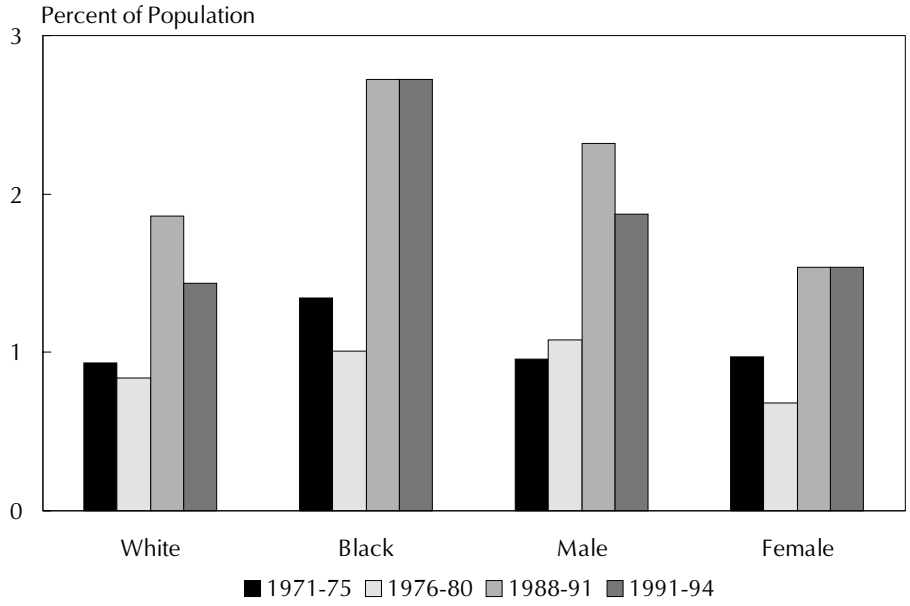
Chart 3-33
Change in Age-Adjusted Death Rates* for Coronary Heart Disease in Females by Country, Age 35-74, 1986-1996†



Between 1986 and 1996, 16 countries had a steeper decline in CHD mortality in females than the United States.[11, 22]

* Age-adjusted to the European standard.
** Based on a log linear regression of the actual rates.
† Data for 1996 unless otherwise noted in parentheses.
‡ Eighth revision of the ICD.

Chart 3-34
Prevalence* of Congestive Heart Failure by Race and Sex, Age 25-74, U.S., 1971-75 to 1991-94

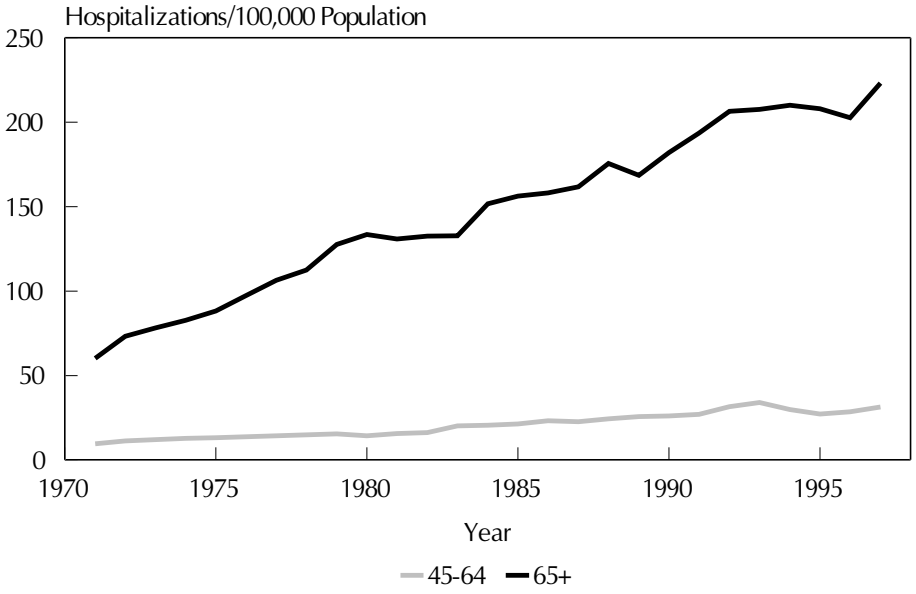


Between 1976-80 and 1988-91, the prevalence of CHF increased substantially in each group: male and female, black and white, and remained at about those levels in 1991-94.[18]

* Age-adjusted to the 2000 standard.

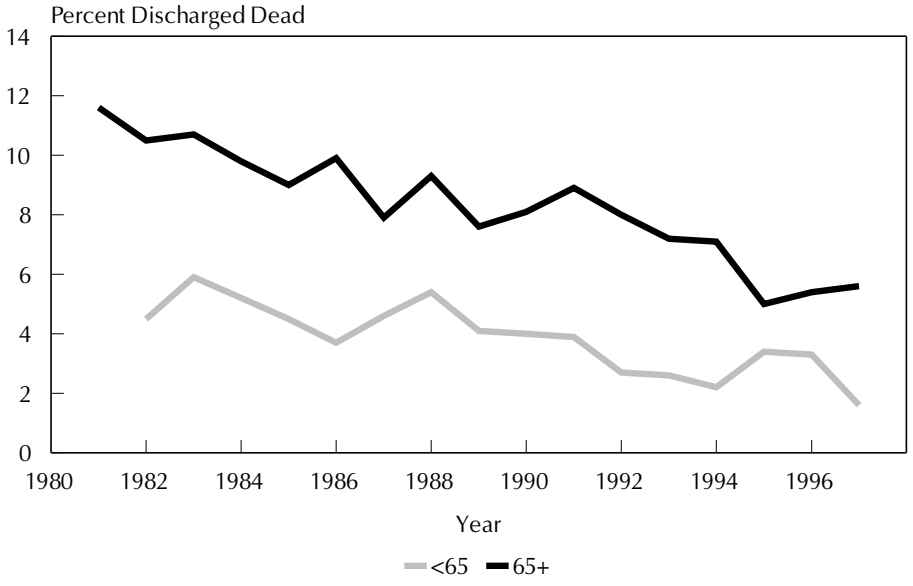
Congestive Heart Failure

Chart 3-35
Hospitalization Rates for Congestive Heart Failure, Age 45-64 and 65+, U.S., 1971-1997



Between 1971 and 1997, CHF hospitalization rates more than tripled.[38]

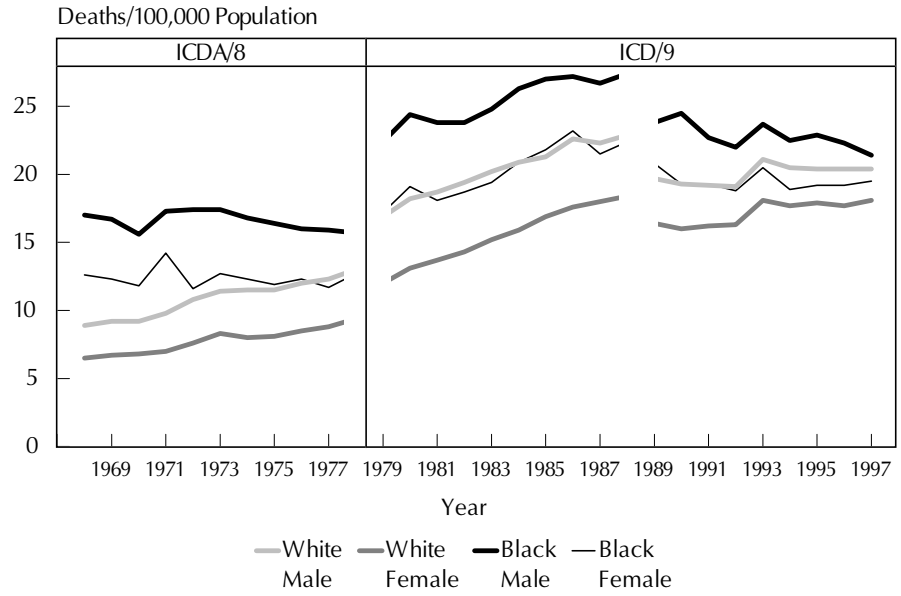
Chart 3-36
Hospital Case-Fatality Rates for Congestive Heart Failure, Age <65 and 65+, U.S., 1981-1997



The percent of hospital discharges for CHF that were discharged dead declined during the 1981-97 period.[38]

Congestive Heart Failure

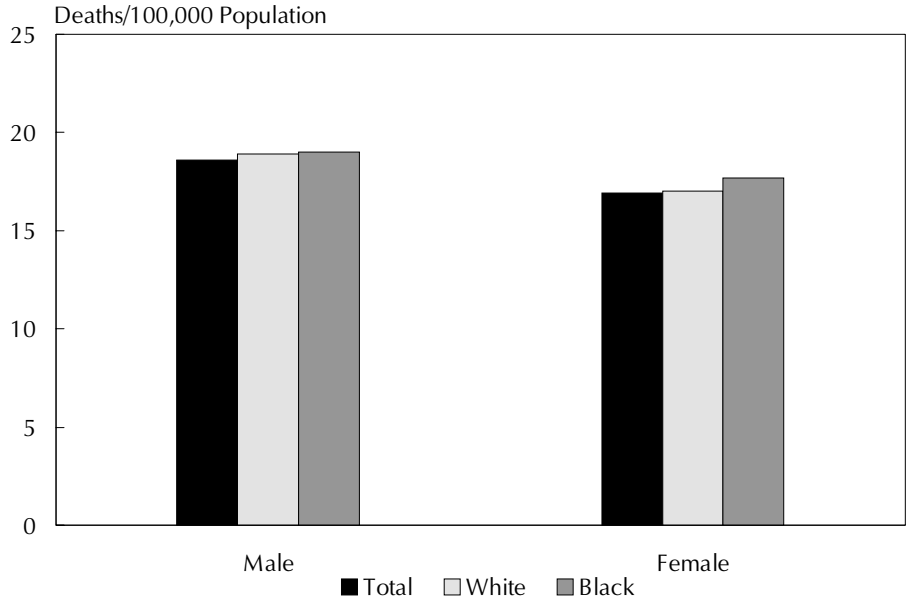
Chart 3-37
Age-Adjusted Death Rates* for Congestive Heart Failure
by Race and Sex, U.S., 1968-1997



Increasing trends in CHF death rates, which began in or before 1968 for whites and in 1979 for blacks, have leveled off in the 1990s.[15, 22]

* Age-adjusted to the 2000 standard.
Note: The magnitude of mortality from heart failure was affected by revision of the ICD in 1979 and the change in cause-of-death coding instruction examples on death certificates in 1989.

Chart 3-38
Age-Adjusted Death Rates* for Congestive Heart Failure
by Race and Sex, U.S., 1997

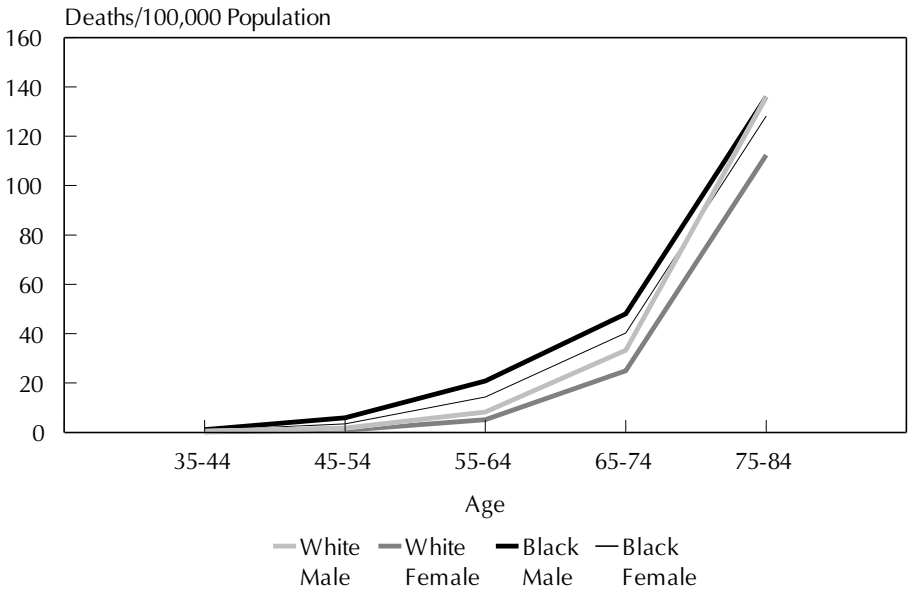


Death rates for CHF are relatively similar in blacks and in whites, but are slightly higher in males than in females.[15]

* Age-adjusted to the 2000 standard.

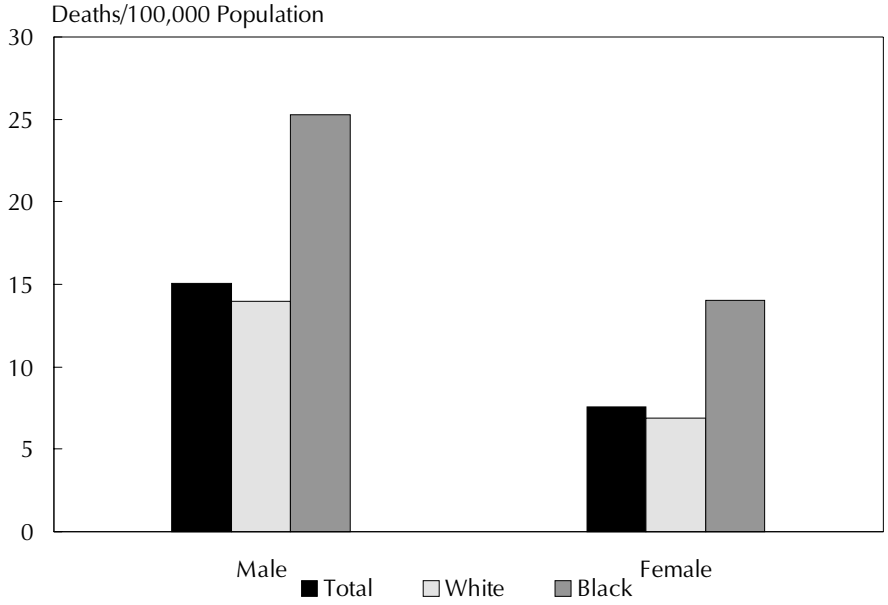
Congestive Heart Failure/Cardiomyopathy

Chart 3-39
Death Rates for Congestive Heart Failure
by Age, Race, and Sex, U.S., 1997



Over the age range 35 to 84, CHF mortality in 1997 was higher in males than in females within the race groups and was higher in blacks than in whites in the sex groups.[15]

Chart 3-40
Age-Adjusted Death Rates* for Cardiomyopathy
by Race and Sex, U.S., 1997

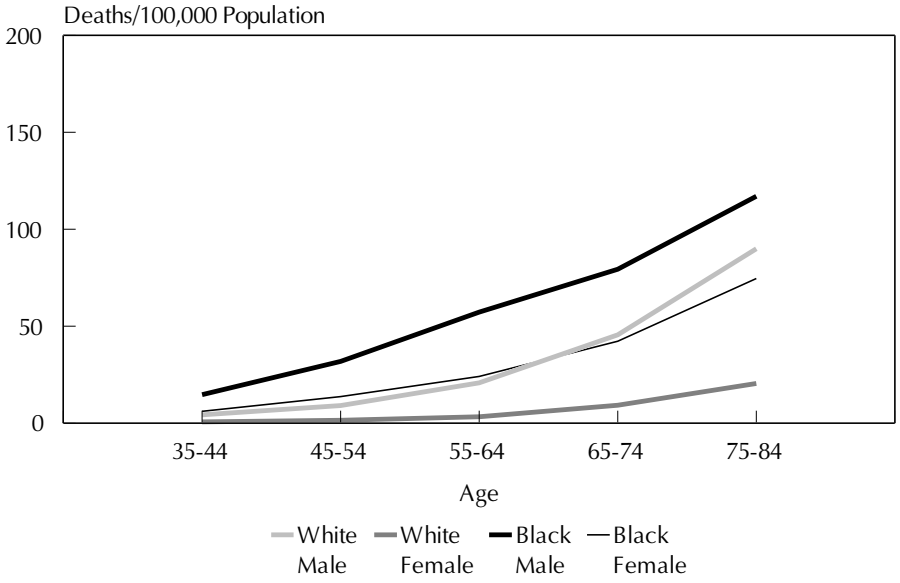


The cardiomyopathy death rate is approximately twice as high in blacks as in whites. It is also approximately twice as high in males as in females.[15]

* Age-adjusted to the 2000 standard.

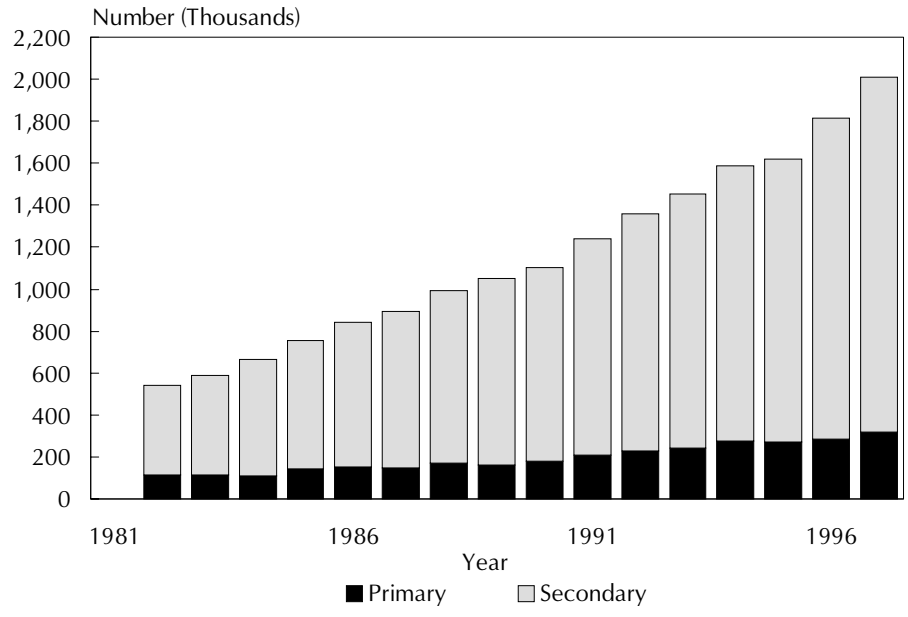
Cardiomyopathy/Atrial Fibrillation

Chart 3-41
Death Rates for Cardiomyopathy by Age, Race, and Sex, U.S., 1997



Black-white and male-female gaps in mortality from cardiomyopathy exist at all ages.[15]

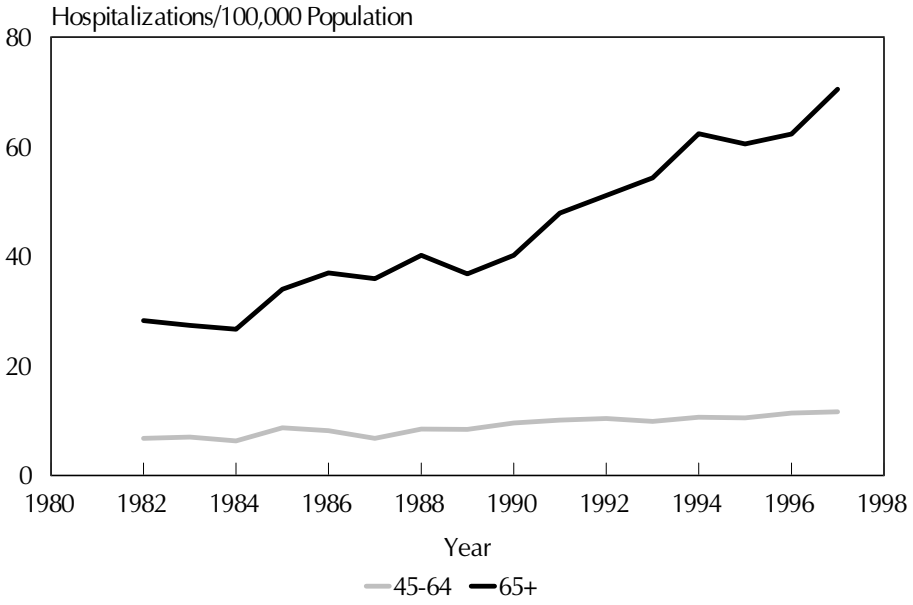
Chart 3-42
Hospitalizations for Atrial Fibrillation, U.S., 1982-1997



Between 1982 and 1997, the number of hospitalizations with atrial fibrillation as primary or secondary diagnosis increased.[38]

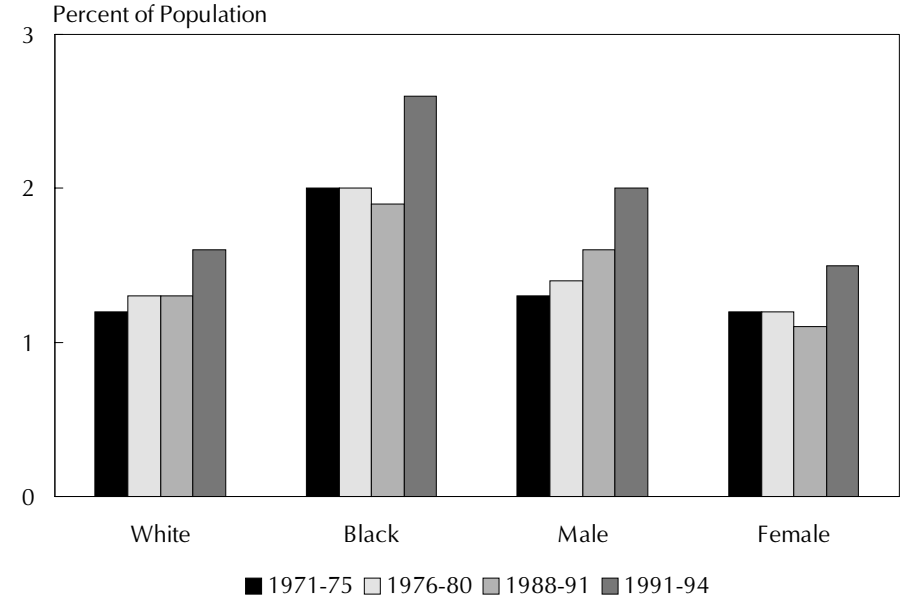
Atrial Fibrillation/Cerebrovascular Diseases (Stroke)

Chart 3-43
Hospitalization Rates for Atrial Fibrillation by Age, U.S., 1982-1997



Between 1982 and 1997, the hospitalization rate for atrial fibrillation increased 70% at age 45-64, and it more than doubled at age 65 and over.[38]

Chart 3-44
Prevalence* of Stroke, Age 25-74, U.S., 1971-75 to 1991-94

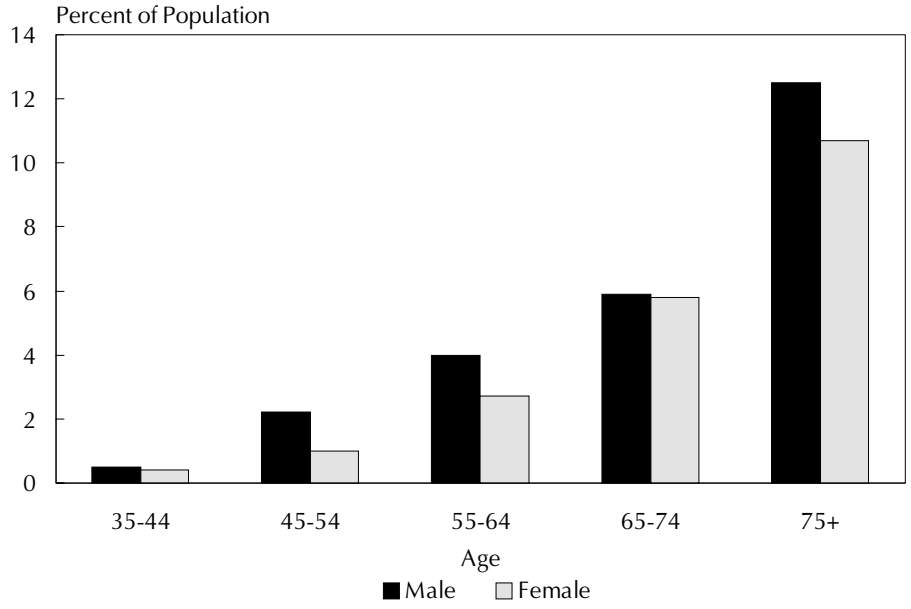


Between 1971-75 and 1991-94, the prevalence of stroke increased in each group: male and female, black and white.[18]

* Age-adjusted to the 2000 standard.

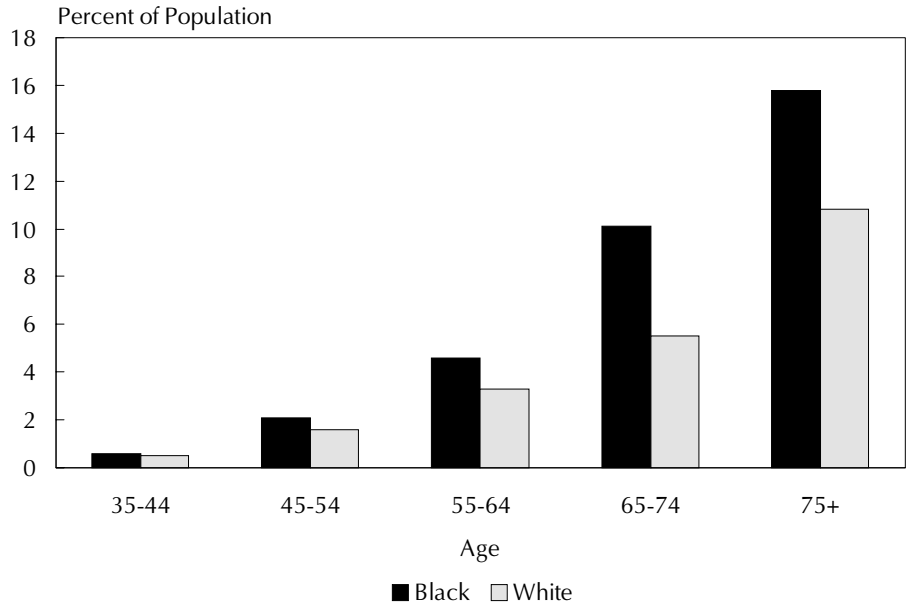
Cerebrovascular Diseases (Stroke)

Chart 3-45
Prevalence of Stroke
by Age and Sex, U.S., 1988-1994



The prevalence of stroke is higher in males than in females at all ages.[18]

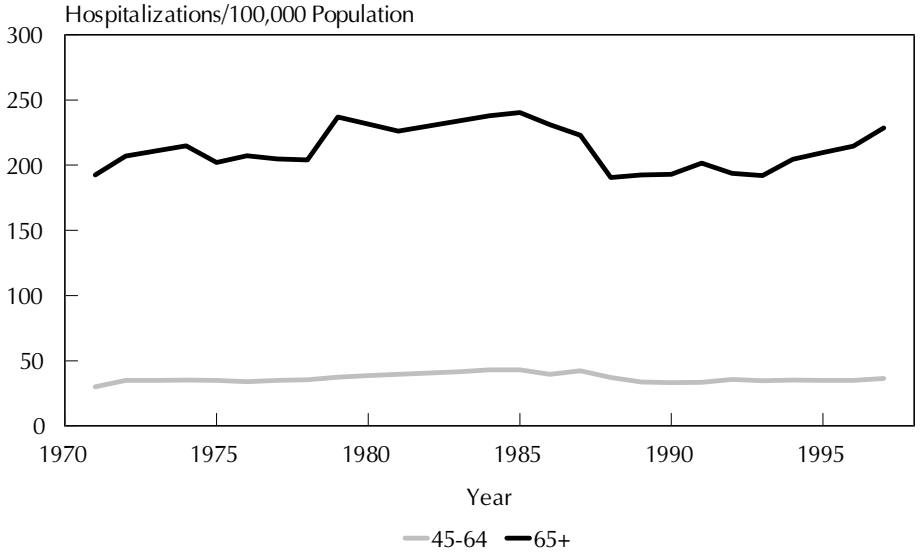
Chart 3-46
Prevalence of Stroke
by Age and Race, U.S., 1988-1994



The prevalence of stroke is higher in blacks than in whites at all ages.[18]

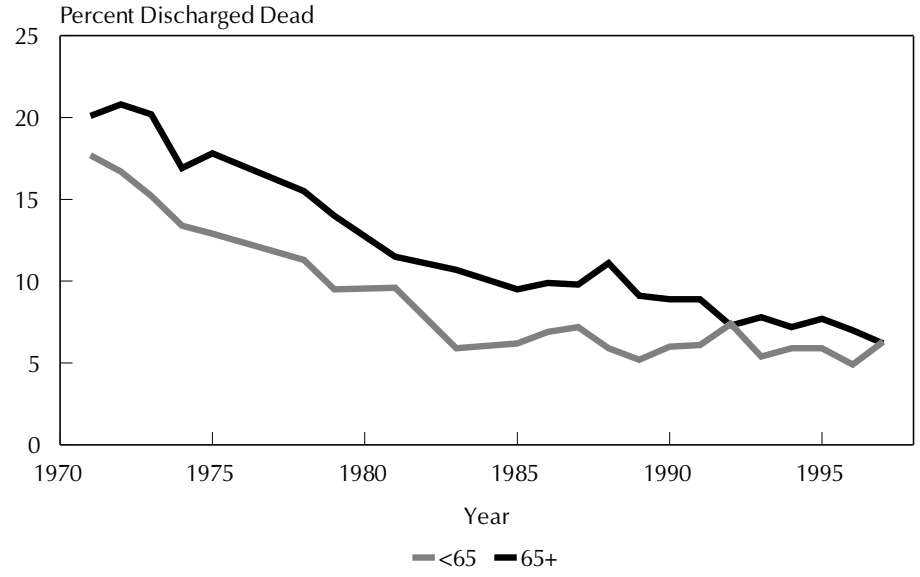
Cerebrovascular Diseases (Stroke)

Chart 3-47
Hospitalization Rates for Stroke,
Age 45-64 and 65+, U.S., 1971-1997



Hospitalization rates for stroke increased between 1971 and the mid-1980s. After a modest decline, the rates remained relatively level in the 1990s for ages 45-64, but increased again for ages 65+.[38]

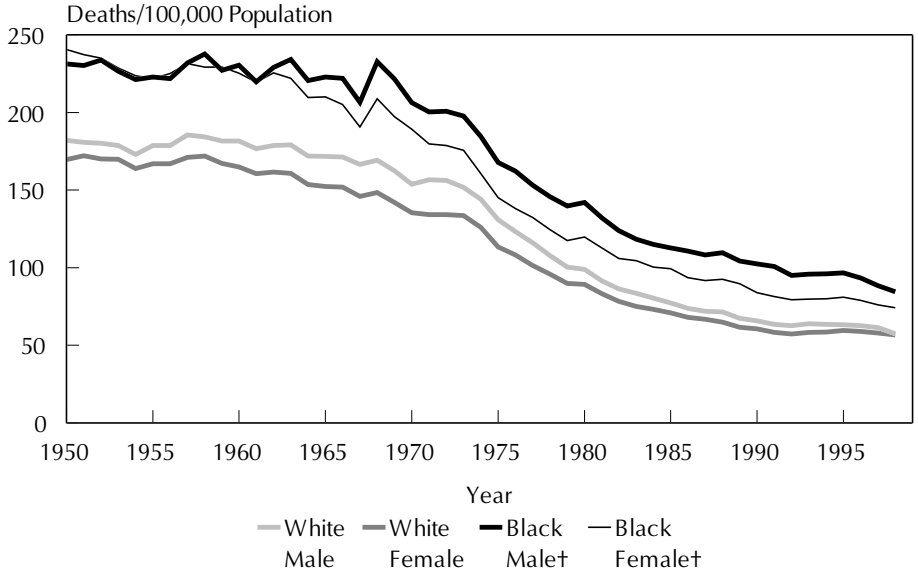
Chart 3-48
Hospital Case-Fatality Rate for Stroke,
Age <65 and 65+, U.S., 1971-1997



Hospital case-fatality rates for stroke, ages <65 and 65+ declined appreciably between 1971 and the mid-1980s and modestly since then.[38]

Cerebrovascular Diseases (Stroke)

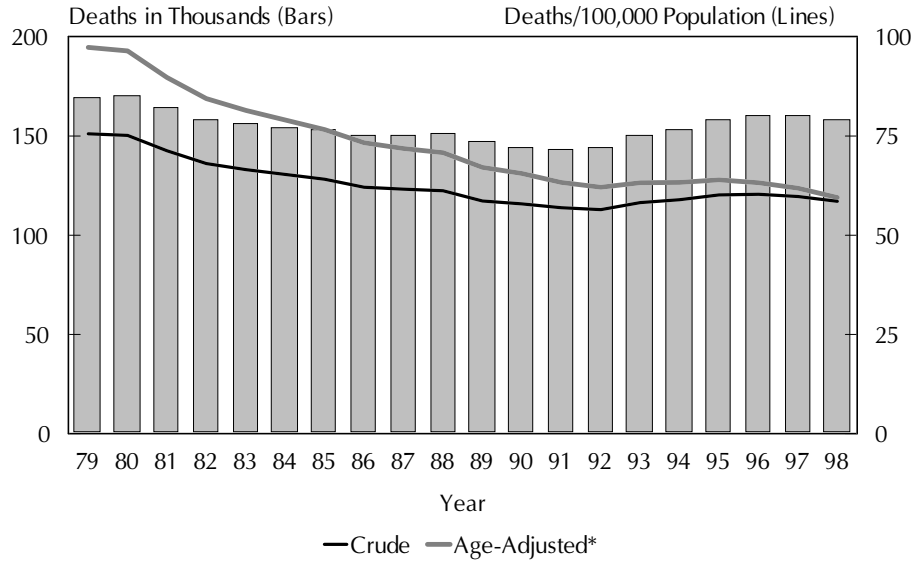
Chart 3-49
Age-Adjusted Death Rates* for Stroke
by Race and Sex, U.S., 1950-1998



The steady and steep decline in stroke mortality that occurred for all four groups in the 1970s slowed in the 1980s and 1990s.[15, 22, 29]

* Age-adjusted to the 2000 standard.
† Nonwhite from 1950 to 1967.

Chart 3-50
Deaths and Death Rates for Stroke,
U.S., 1979-1998

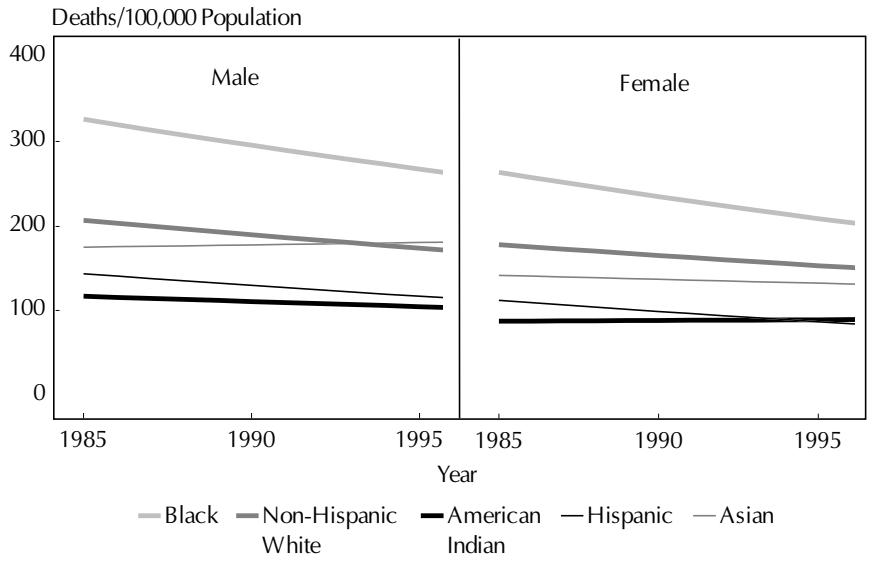


Between 1979 and the early 1990s, the number of deaths and crude and adjusted death rates for stroke declined. Since then, the number of deaths has increased modestly.[15, 22, 29]

* Age-adjusted to the 2000 standard.

Cerebrovascular Diseases (Stroke)

Chart 3-51
Age-Adjusted Death Rates* for Stroke
by Race/Ethnicity and Sex, Age 45+, U.S., 1985-1997



Between 1985 and 1997, stroke mortality at age 45+ declined appreciably in whites, blacks, and Hispanics; it also decreased modestly in Asian females and American Indian males, but increased in Asian males and American Indian females.[12]

* Age-adjusted to the 2000 standard.

Chart 3-52
Average Annual Percent Change in Age-Adjusted Death Rates* for Stroke by Race and Sex, U.S., 1960-1998

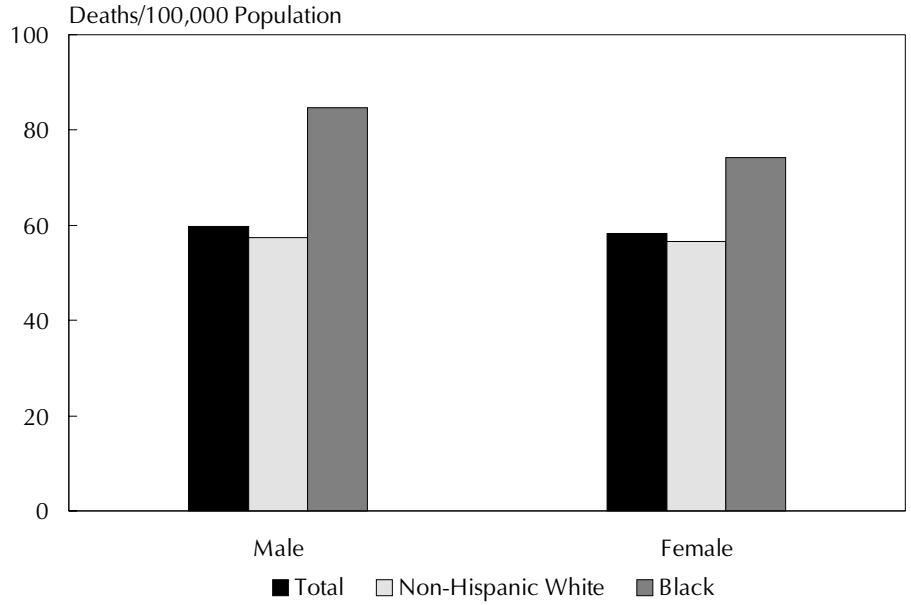
Period	Total Population	White Male	White Female	Black Male	Black Female
1960-1965	-1.3	-1.0	-1.5	-0.4	-1.4
1965-1970	-2.2	-2.0	-2.2	-0.8	-1.5
1970-1975	-3.2	-3.0	-3.1	-3.6	-4.7
1975-1980	-5.2	-5.8	-5.0	-3.7	-4.2
1980-1985	-4.4	-4.6	-4.4	-4.5	-3.6
1985-1990	-3.0	-3.1	-3.1	-1.8	-2.7
1990-1995	-0.3	-0.5	-0.2	-1.2	-0.7
1995-1998	-2.3	-3.0	-1.7	-4.4	-3.0

The steep declines in stroke mortality that occurred in males and in females, and in whites and in blacks, during the 1970s and 1980s were followed by very modest percent changes from 1990 to 1995 and appreciable declines from 1995 to 1998.[15, 22, 29]

* Age-adjusted to the 2000 standard.

Cerebrovascular Diseases (Stroke)

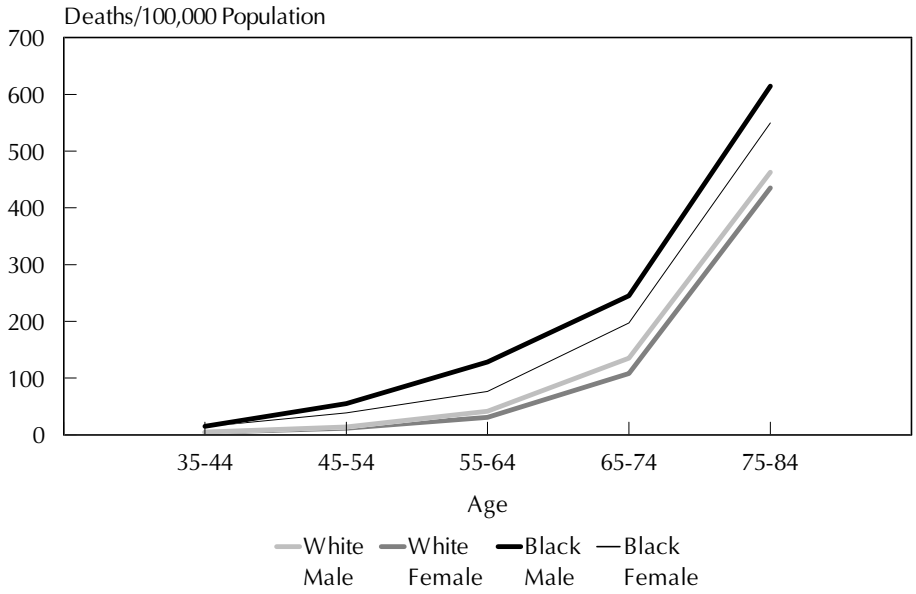
Chart 3-53
Age-Adjusted Death Rates* for Stroke
by Race and Sex, U.S., 1998



Stroke mortality is appreciably higher in blacks than in whites and about the same in males and females.[29]

* Age-adjusted to the 2000 standard.

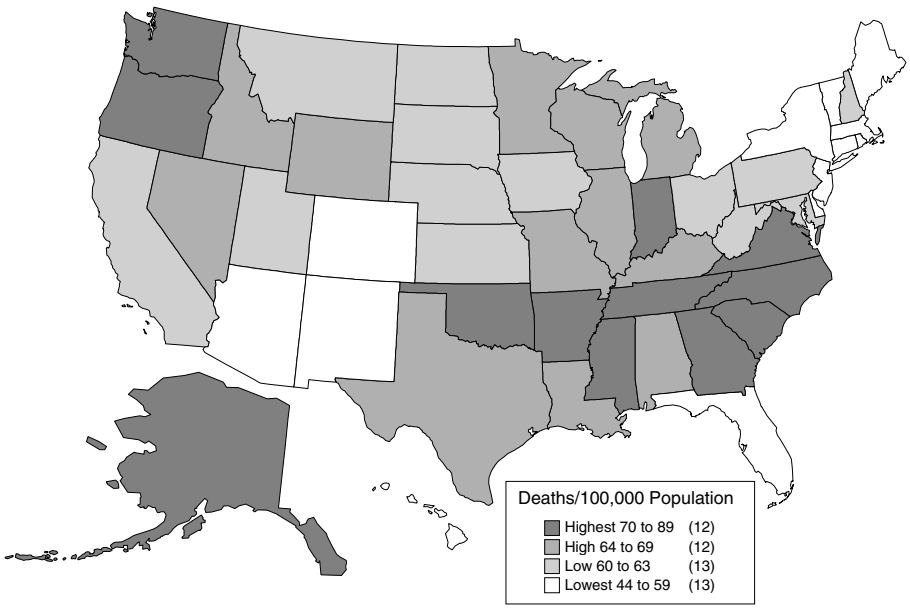
Chart 3-54
Death Rates for Stroke
by Age, Race, and Sex, U.S., 1998



Stroke mortality is higher in blacks than in whites and higher in males than in females for blacks and for whites at all ages.[29]

Cerebrovascular Diseases (Stroke)

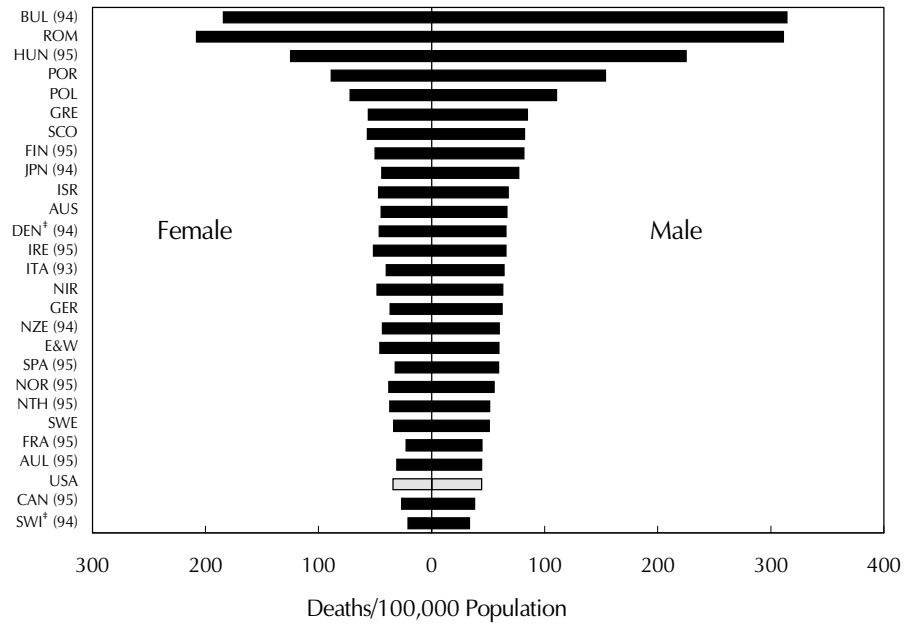
Chart 3-55
Age-Adjusted Death Rates* for Stroke
by State, U.S., 1995-1997



Stroke mortality is highest in most of the southeastern states, most of which compose "the stroke belt"; Indiana; and the northern Pacific states.[15]

* Age-adjusted to the 2000 standard.

Chart 3-56
Age-Adjusted Death Rates* for Stroke
by Country and Sex, Age 35-74, 1996†

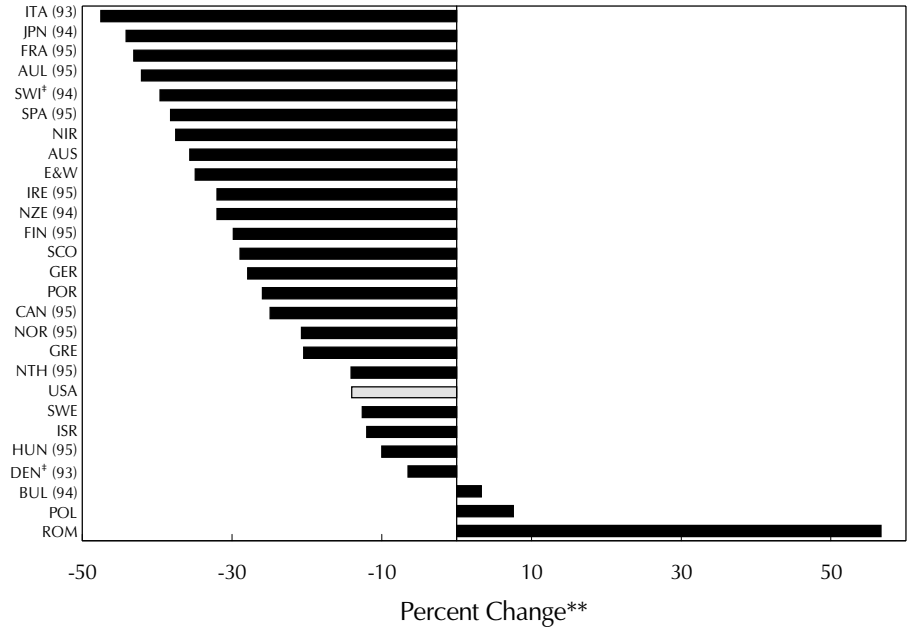


Among 27 industrialized countries, the U.S. has one of the lowest death rates for stroke. Eastern European countries and Portugal have markedly higher rates compared with other countries.[11]

* Age-adjusted to the European standard.
† Data for 1996 unless otherwise noted in parentheses.
‡ Eighth revision of the ICD.

Cerebrovascular Diseases (Stroke)

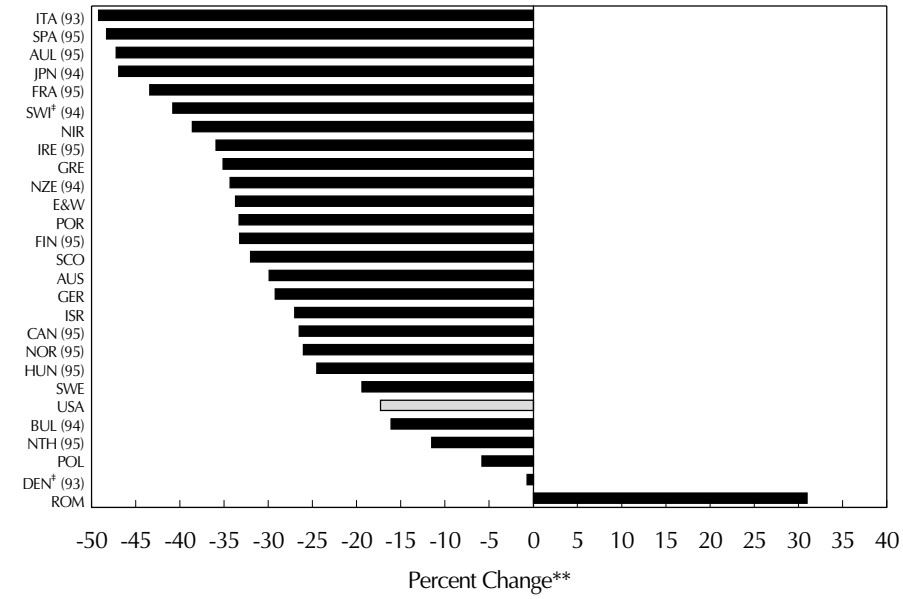
Chart 3-57
Change in Age-Adjusted Death Rates* for Stroke in Males by Country, Age 35-74, 1986-1996†



* Age-adjusted to the European standard.
** Based on a log linear regression of the actual rates.
† Data for 1996 unless otherwise noted in parentheses.
‡ Eighth revision of the ICD.

Between 1986 and 1996, 19 countries had greater percent declines in stroke mortality for males than the U.S.[11]

Chart 3-58
Change in Age-Adjusted Death Rates* for Stroke in Females by Country, Age 35-74, 1986-1996†

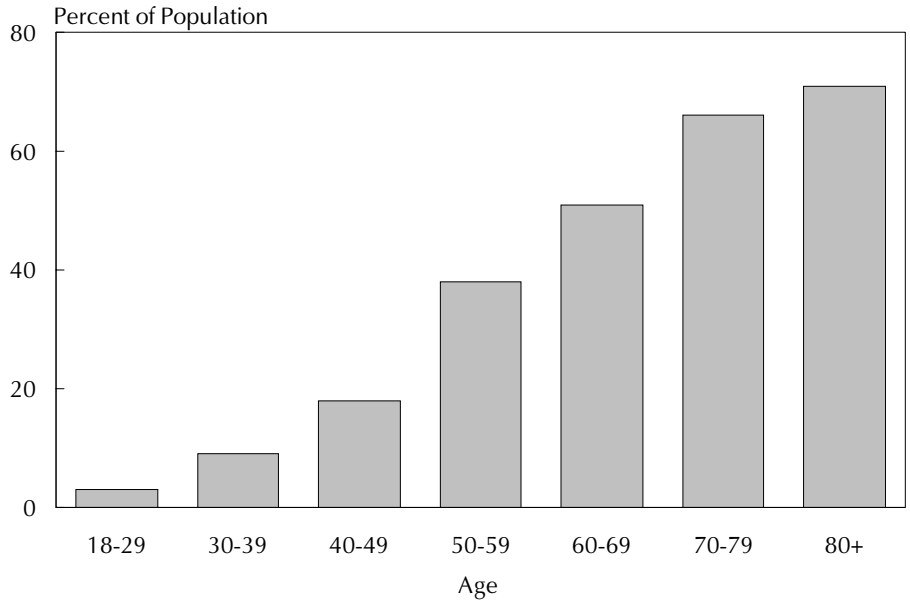


* Age-adjusted to the European standard.
** Based on a log linear regression of the actual rates.
† Data for 1996 unless otherwise noted in parentheses.
‡ Eighth revision of the ICD.

Between 1986 and 1996, 20 countries had greater percent declines in stroke mortality for females than the U.S.[11]

Hypertension

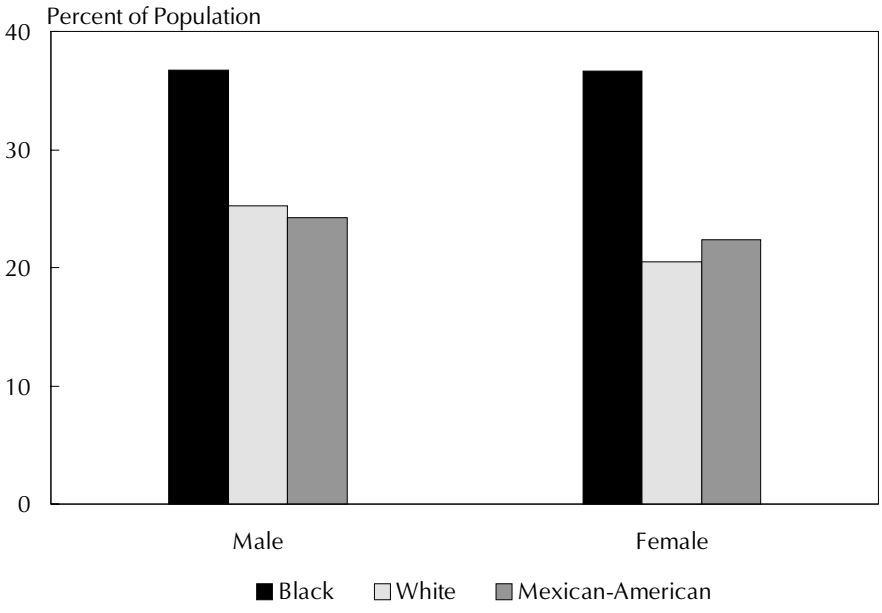
Chart 3-59
Prevalence of Hypertension
by Age, U.S., 1988-1994



The prevalence of hypertension is 38% at age 50-59, and 71% at age 80+.[18]

Note: Hypertension is defined as systolic BP 140+ mmHg, or 90+ diastolic BP, or on medication.

Chart 3-60
Prevalence* of Hypertension by Race/Ethnicity
and Sex, Age 20-74, U.S., 1988-1994

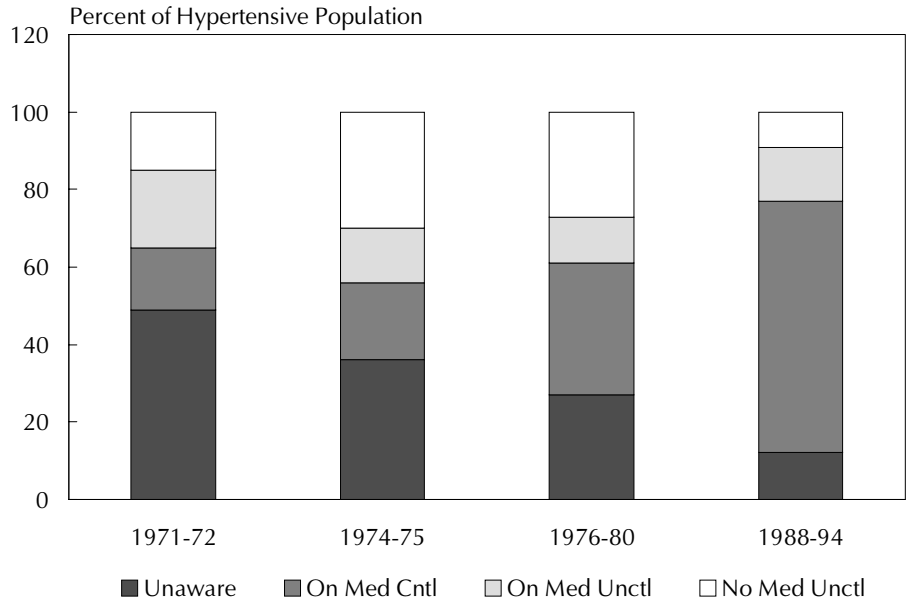


The percent prevalence of hypertension at age 20-74 is appreciably higher in blacks than in whites and is about the same in Mexican-Americans as in whites. The percent prevalence is the same for black males and females, but for whites and Mexican-Americans, it is lower in females than in males.[18]

* Age-adjusted to the 2000 standard.
Note: Hypertension is defined as systolic BP 140+ mmHg, or 90+ diastolic BP, or on medication.

Hypertension

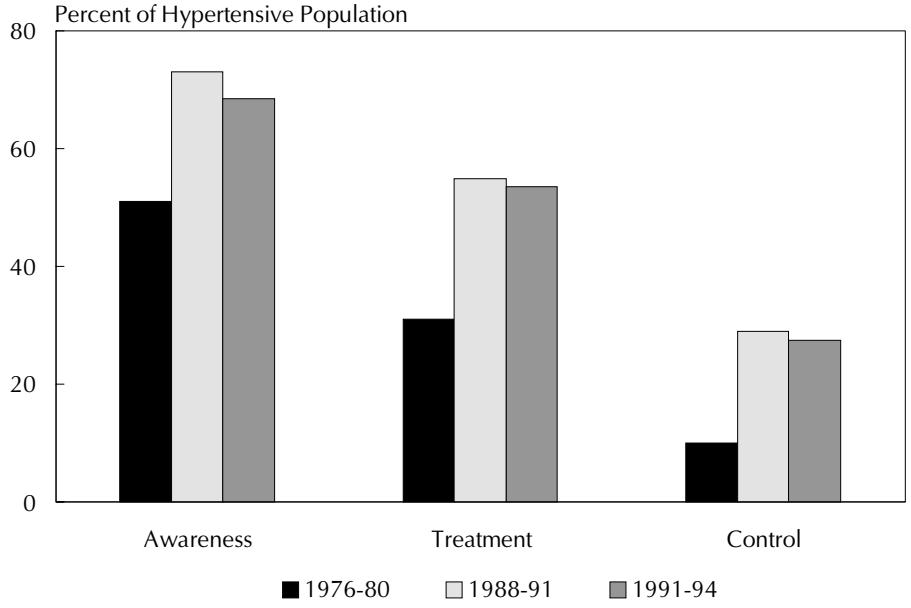
Chart 3-61
Hypertensive Population Aware, Treated, and Controlled, Age 18-74, U.S., 1971-72 to 1988-94



Eighty-eight percent of persons with a high level of hypertension were aware of their condition in 1988-94 compared with 51% in 1971-72. The percent of hypertensive persons treated and controlled increased from 16% in 1971-72 to 65% in 1988-94.[18]

Note: Hypertension is defined as systolic BP 160+ mmHg, or 95+ diastolic BP, or on medication.
MED = medication, CNTL = controlled, UNCNTL = uncontrolled.

Chart 3-62
Hypertensive Population Aware, Treated, and Controlled, Age 18-74, U.S., 1976-80, 1988-91, and 1991-94

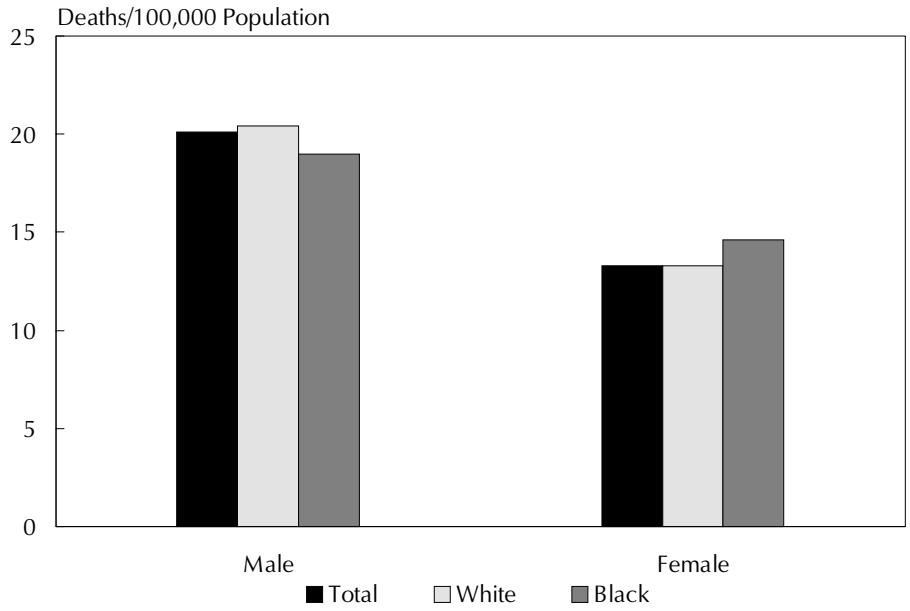


In 1988-91, 73% of hypertensive patients were aware of their condition, 55% were on treatment for it, and 29% had it controlled. Those percentages were appreciably greater than the comparable figures for the 1976-1980 period and remained relatively stable in 1991-94.[39]

Note: Hypertension is defined as systolic BP 140+ mmHg, or 90+ diastolic BP, or on medication.

Diseases of Arteries

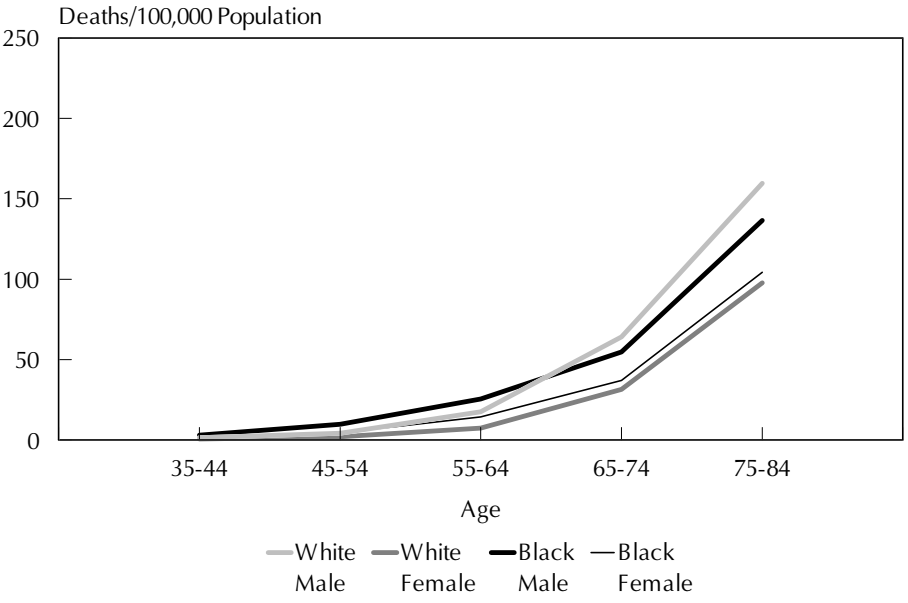
Chart 3-63
Age-Adjusted Death Rates* for Diseases of Arteries by Race and Sex, U.S., 1998



Death rates for diseases of arteries are higher in males than in females, and about the same in blacks and in whites.[29]

* Age-adjusted to the 2000 standard.

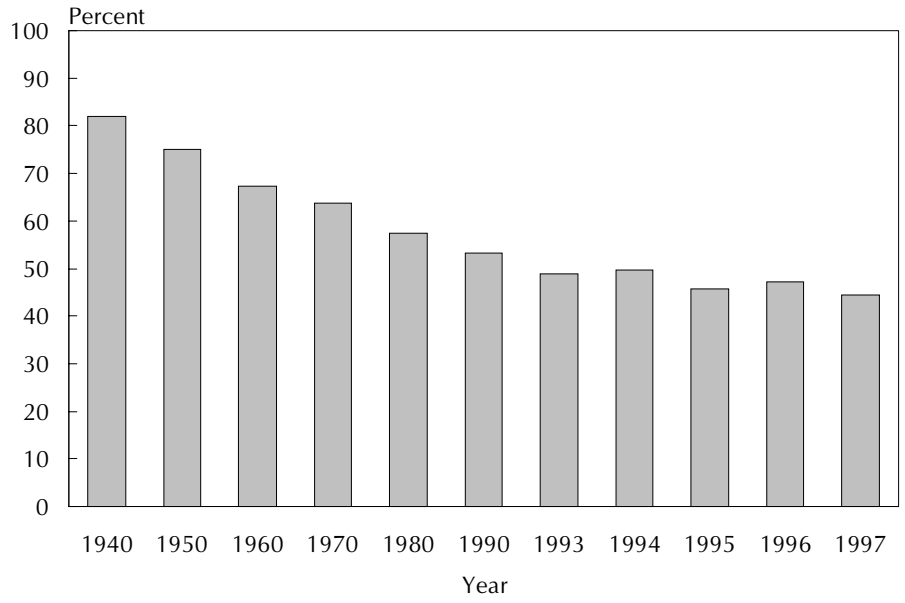
Chart 3-64
Death Rates for Diseases of Arteries by Age, Race, and Sex, U.S., 1998



Death rates for diseases of arteries are higher in males than in females for blacks and for whites at all ages. They are higher in black females than white females at all ages, and higher in black males than white males age <65, but not 65+.[29]

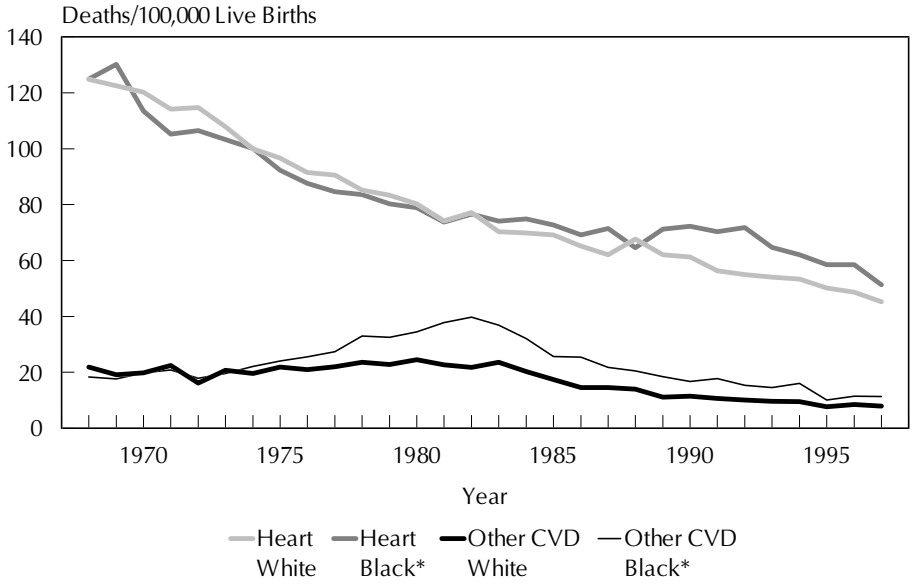
Congenital Anomalies of the Circulatory System

Chart 3-65
Percent of Deaths From Congenital Anomalies of the Circulatory System, Age <1, U.S., 1940-1997



The percentage of deaths from congenital anomalies of the circulatory system occurring at younger than age 1 declined from 82% in 1940 to 44.5% in 1997.[15, 22]

Chart 3-66
Infant Mortality From Congenital Anomalies of the Circulatory System by Race, U.S., 1968-1997



Infant congenital heart disease mortality declined in the 1970s and 1980s in blacks and in whites. For other congenital anomalies of the circulatory system, the trend has been downwards only since the early 1980s.[15, 22]

* Rates before 1979 are for nonwhites.

4. Lung Diseases

In this chapter, the diagnostic group *lung diseases* focuses on chronic obstructive pulmonary disease (COPD), asthma, and neonatal respiratory distress syndrome (RDS). Charts show morbidity and mortality data for COPD and asthma; for neonatal respiratory distress syndrome, only infant mortality is provided.

COPD and allied conditions (ICD/9 codes 490-496) constitute the fourth leading cause of death in 1998. In 1997, more than 104,000 deaths were attributed to this category of diseases; 76.9 percent to the generalized category "chronic airways obstruction"; 15.7 percent to emphysema; 4.7 percent to asthma; and 2.7 percent to chronic bronchitis (Chart 4-1).

Chart 4-2 contains a list of selected lung diseases along with the ninth revision ICD codes. It also includes 1997 estimates of hospital discharges, durations of stay, physician office visits, and death for these diagnostic categories. The terminology used is modified from the exact ICD terminology provided in Appendix A. Subsequent graphs display morbidity and mortality for COPD, asthma, and neonatal RDS.

Chronic Obstructive Pulmonary Disease

For the purpose of this Chart Book, COPD mortality includes chronic and unspecified bronchitis, emphysema, and chronic airways obstruction (codes 490-492, 494-496). Hospitalization and physician office visit statistics for COPD are also classified in this manner. For prevalence, however, COPD comprises only emphysema and chronic bronchitis.

The overall effects of the ICD revisions on COPD mortality and morbidity tend to be minor. In the ICDA/8 (1968 to 1978), as adapted for use in the United States, a special code "chronic obstructive lung diseases" (519.3) was introduced to cover the conditions now classified under chronic airways obstruction.

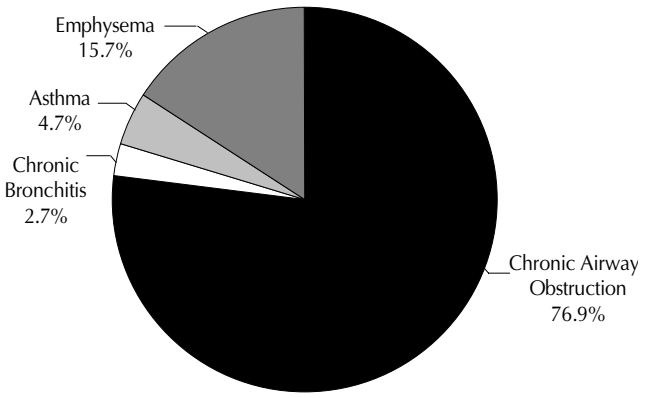
Asthma

Between 1968 and 1978, the period covered by the ICDA/8, asthma mortality declined. However, when the ninth revision was introduced in 1979, asthma mortality began to increase and the trend has been upward thereafter. One explanation for this change in trend may be that the latest revision of the ICD contains diagnostic terms not found in the previous one. Another reason may be that the increased attention directed towards this disease has led to improvement in its diagnosis. Whatever the reason, it is difficult to determine to what extent the change in trend is influenced by the revision in ICD codes.

Neonatal Respiratory Distress Syndrome

Neonatal RDS is the fourth leading cause of infant mortality in the United States. In 1998, 1,328 infants under the age of 1 year died from this disorder.

Chart 4-1
Deaths From Chronic Obstructive Pulmonary Disease and Allied Conditions, Percent by Subgroup, U.S., 1998



Total Deaths = 114,381 (100%)

Lung Diseases

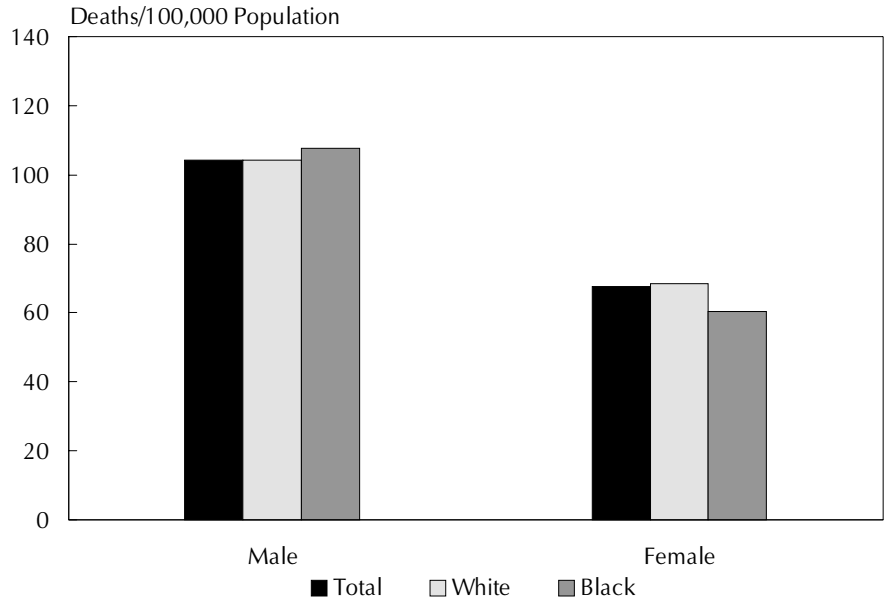
Chart 4-2
Number of Hospitalizations, Physician Office Visits, and Deaths for Selected Lung Diseases, U.S., 1997

Diagnostic Category	ICD/9 Codes	Hospitalizations: First-Listed Discharge (000)	Hospitalizations: Length of Stay (Days)	Physician Office Visits (000)	Deaths
Chronic obstructive pulmonary disease (COPD)	490-492, 494-496	634	5.4	13,429	103,595
Bronchitis, not specified as acute or chronic; chronic bronchitis	490, 491	469	5.3	9,727	3,055
Emphysema	492	23	6.2	389	13,518
Chronic airways obstruction, NEC*	494-496	142	5.8	3,313	83,022
Asthma	493	484	3.4	9,834	5,434
Acute bronchitis and bronchiolitis	466	271	3.5	2,830	465
ARDS** and respiratory failure	518.5, 518.8	193	9.5	180	4,829
Pulmonary edema	518.4	13	4.8	18	156
Cystic fibrosis	277.0	9	11.6	268	468
Pneumonia and influenza	480-487	1,323	6.3	4,588	86,449
Interstitial lung disorders					
Chronic interstitial pneumonia	515	21	6.5	188	8,307
Granulomatosis, sarcoidosis	135, 446.4	11	5.2	524	980
Tuberculosis	011, 012	6	12.5	30	874
Neonatal pulmonary disorders					
Respiratory distress syndrome	769	11	26.8	–	1,309
Immaturity, unqualified	765	20	20.0	118	3,930
Other neonatal pulmonary disorders	770	29	8.9	–	1,781

* Includes bronchiectasis (494) and extrinsic allergic alveolitis (495), which are not common. NEC = not elsewhere classified.
Note: Estimates of hospitalizations and physician office visits are subject to sampling variability. Estimates of hospitalizations below 50,000 have a relative standard error of more than 11 percent. Estimates of physician office visits below 588,000 have a relative standard error of more than 30 percent.
Compiled from references 15, 34, and 35.
** ARDS = adult respiratory distress syndrome.

Lung Diseases

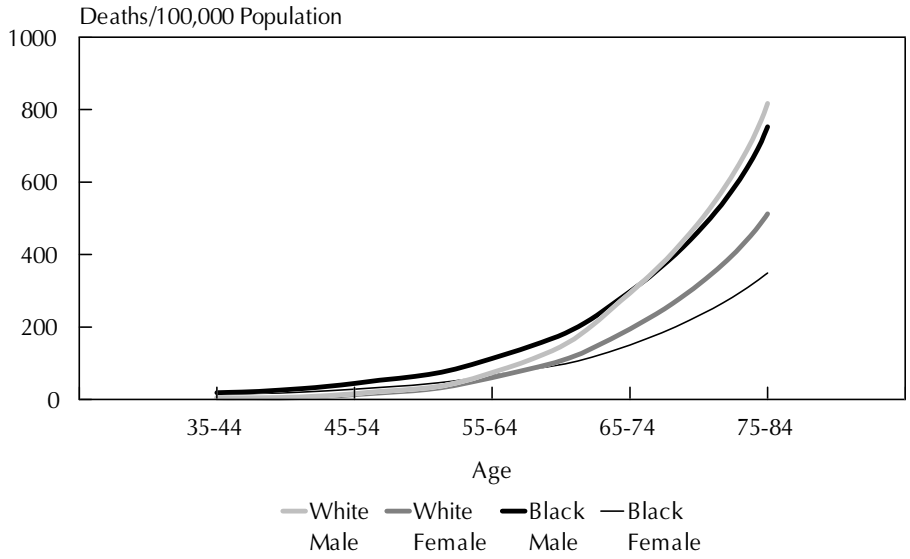
Chart 4-3
Age-Adjusted Death Rates* for Total Lung Diseases
by Race and Sex, U.S., 1997



In 1997, lung disease mortality (other than lung cancer) was higher in males than in females. It was similar for black and white males, but among females, it was higher for whites than for blacks.[15]

* Age-adjusted to the 2000 standard.

Chart 4-4
Death Rates for Total Lung Diseases
by Age, Race, and Sex, U.S., 1997

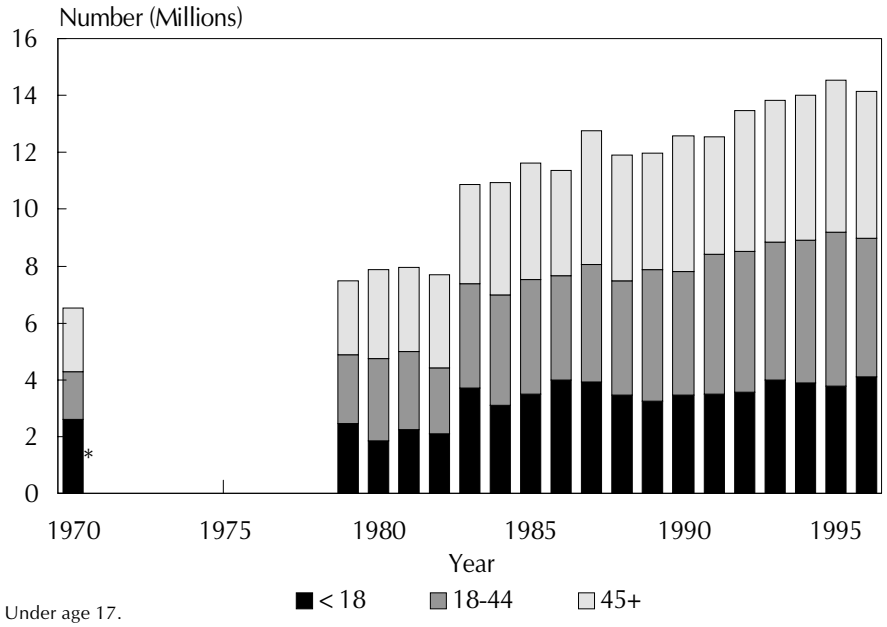


In 1997, the male-female gap in mortality from total lung diseases increased for blacks and whites with increasing age.[15]

Note: Lung diseases include tuberculosis, sarcoidosis, cystic fibrosis, acute bronchitis, influenza, pneumonia, COPD, asthma, interstitial lung disorders, ARDS, pulmonary edema, and pulmonary heart disease.

Chronic Obstructive Pulmonary Disease

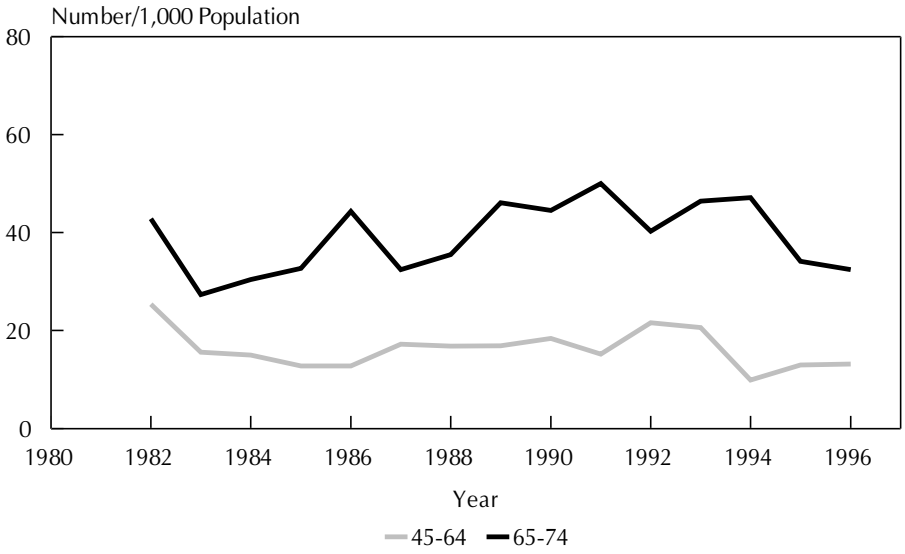
Chart 4-5
Prevalence of Chronic Bronchitis
by Age, U.S., 1970-1996



* Under age 17.

From 1983 to 1995, the prevalence of chronic bronchitis increased relatively steadily. Most of the increase was among persons age 18+. In 1996, the prevalence was 14.1 million.[25, 40]

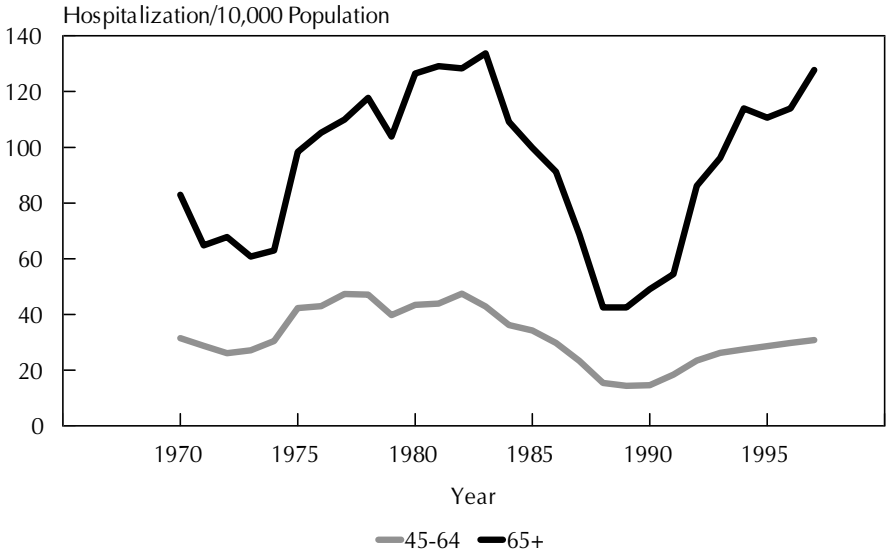
Chart 4-6
Prevalence Rate of Emphysema
by Age, U.S., 1982-1996



There was essentially no change in the prevalence rate of emphysema from 1982 to 1996.[25, 40]

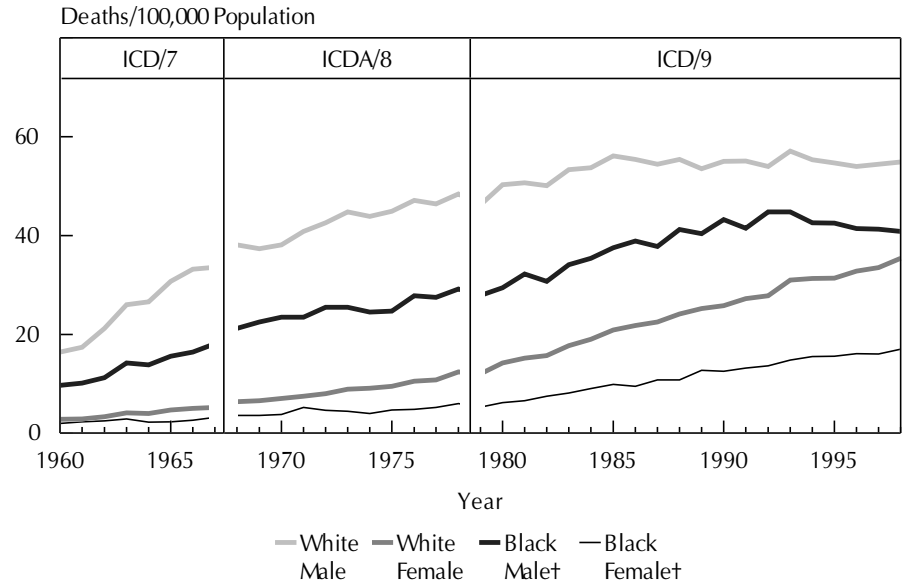
Chronic Obstructive Pulmonary Disease

Chart 4-7
Hospitalization Rates for Chronic Obstructive Pulmonary Disease, Age 45-64 and 65+, U.S., 1970-1997



Between 1970 and 1997, COPD hospitalization rates varied considerably.[38]

Chart 4-8
Age-Adjusted Death Rates* for Chronic Obstructive Pulmonary Disease by Race and Sex, U.S., 1960-1998

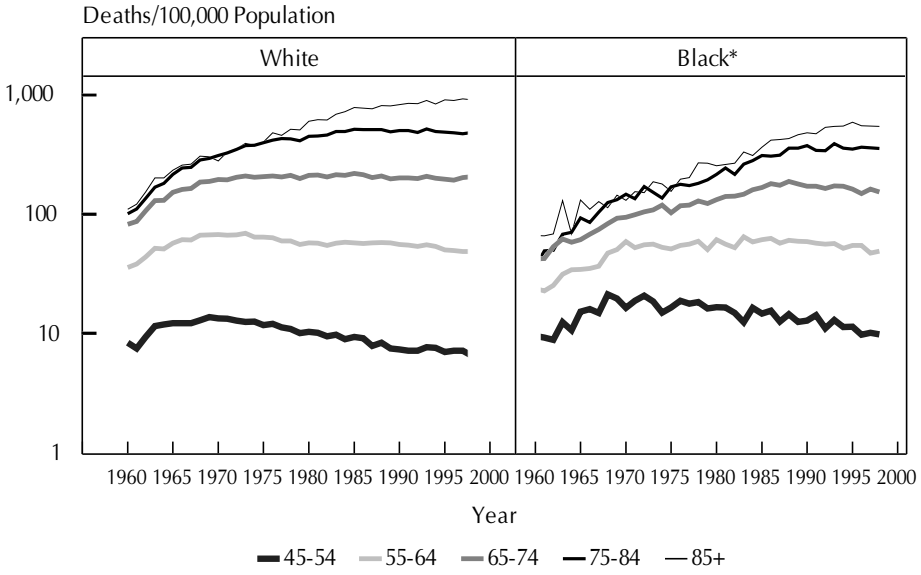


COPD mortality, though highest in white males, remained relatively constant for this group since the early 1980s. During the same period, it gradually increased in black males, but doubled in black females and in white females.[15, 22, 29, 41]

*Age-adjusted to the 2000 standard.
† Nonwhite from 1960 to 1967.

Chronic Obstructive Pulmonary Disease

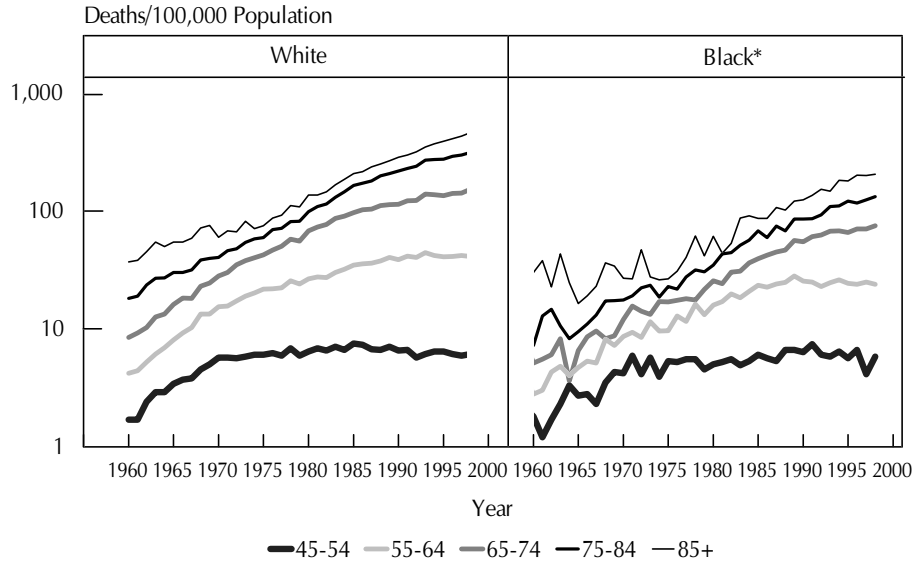
Chart 4-9
Death Rates for Chronic Obstructive Pulmonary Disease in Males by Age and Race, U.S., 1960-1998



After initial increases in the 1960s, the COPD death rates declined in white males and in black males age 45-54, became relatively stable for those at age 55-64, and continued to increase for those at 85+.[15, 22, 29, 41]

* Nonwhite from 1960 to 1967.

Chart 4-10
Death Rates for Chronic Obstructive Pulmonary Disease in Females by Age and Race, U.S., 1960-1998

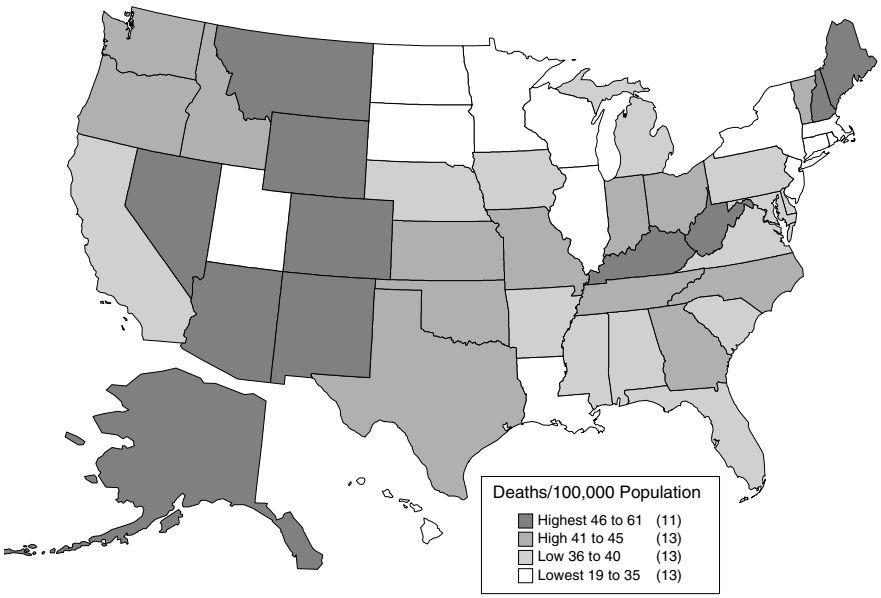


Between 1960 and 1998, COPD death rates increased in white females and in black females at all ages. For the last several years, the rates have been relatively stable among the younger ages, but continued to increase among older ages.[15, 22, 29, 41]

* Nonwhite from 1960 to 1967.

Chronic Obstructive Pulmonary Disease

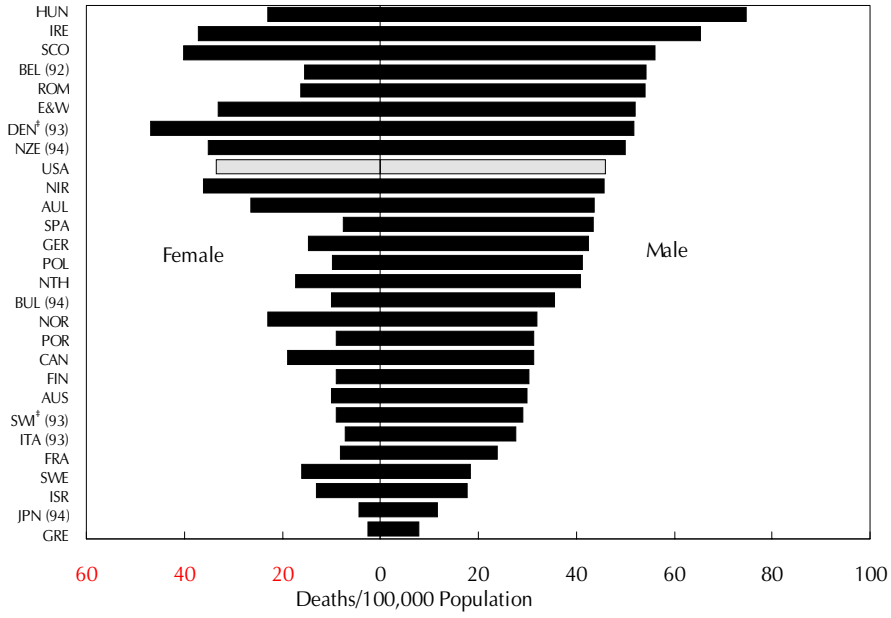
Chart 4-11
Age-Adjusted Death Rates* for Chronic Obstructive Pulmonary Disease by State, U.S., 1995-1997



In 1995-97, COPD mortality tended to be highest in the western mountain states.[15]

* Age-adjusted to the 2000 standard.

Chart 4-12
Age-Adjusted Death Rates* for Chronic Obstructive Pulmonary Disease and Allied Conditions by Country and Sex, Age 35-74, 1995†

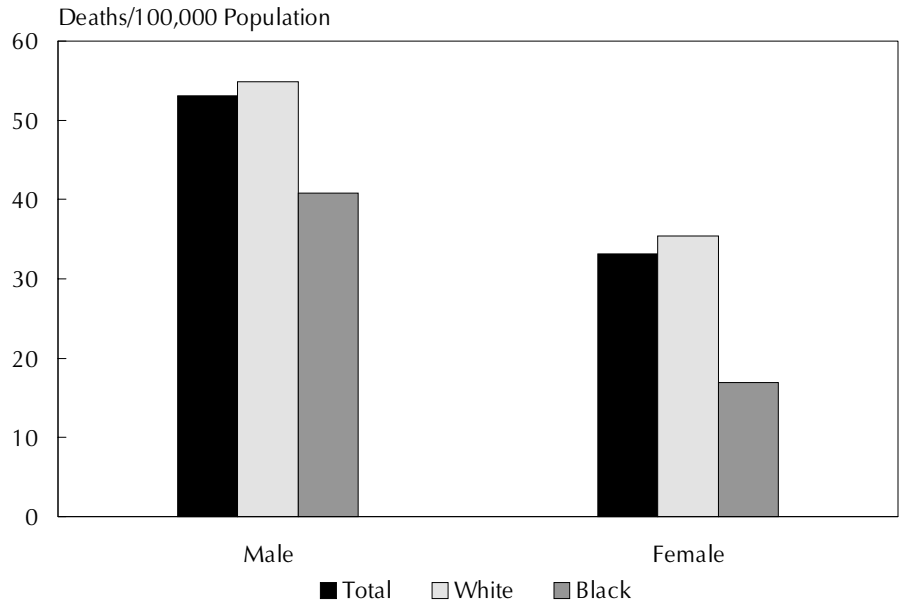


Among 28 industrialized countries, the U.S. ranked 9th in COPD mortality for males and 6th for females in 1995.[11, 22]

* Age-adjusted to the European standard.
† Data for 1995 unless otherwise noted in parentheses.
‡ Eighth revision of the ICD.

Chronic Obstructive Pulmonary Disease

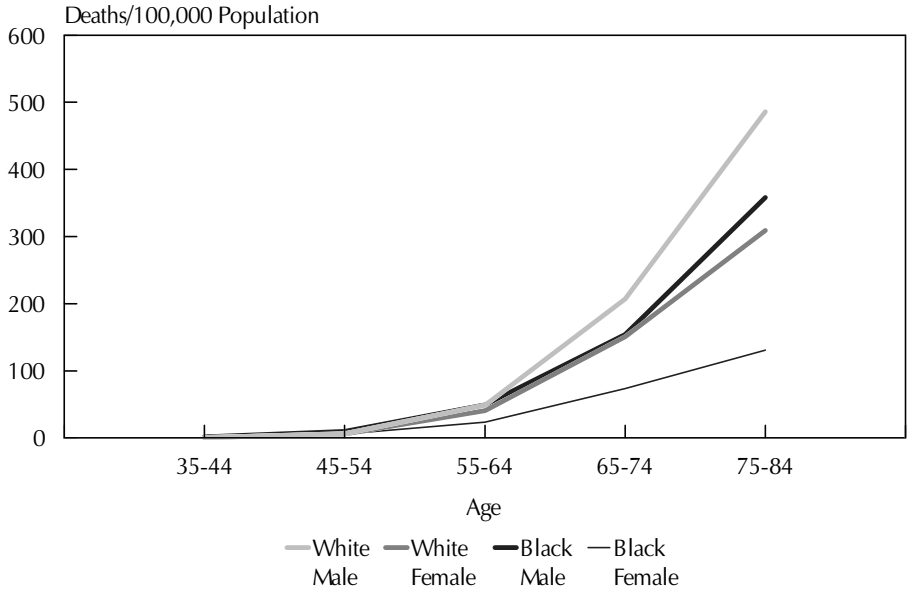
Chart 4-13
Age-Adjusted Death Rates* for Chronic Obstructive Pulmonary Disease by Race and Sex, U.S., 1998



In 1998, COPD mortality was higher in males than in females. For males, it was one-third higher in whites than in blacks, and for females, it was 2 times higher in whites than in blacks.[29]

* Age-adjusted to the 2000 standard.

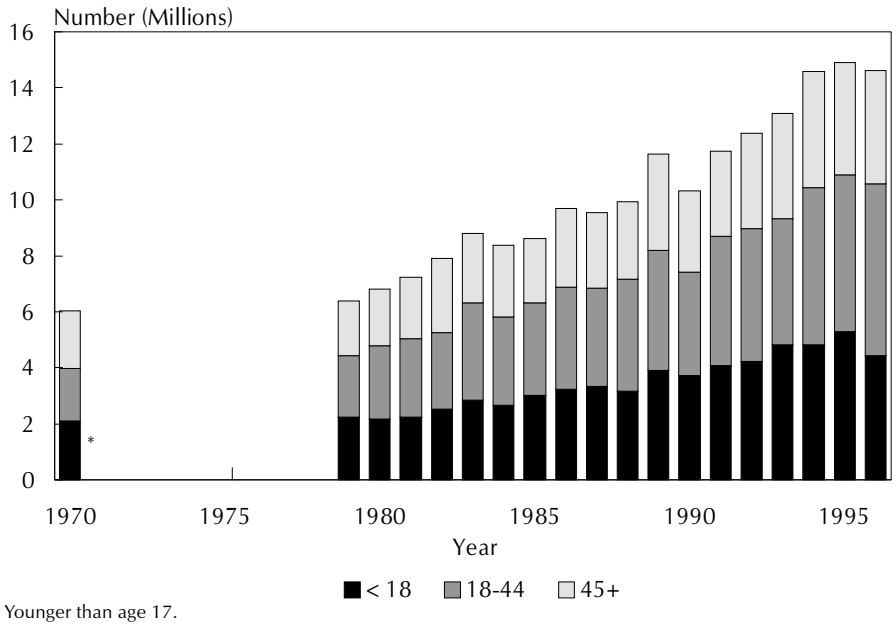
Chart 4-14
Death Rates for Chronic Obstructive Pulmonary Disease by Age, Race, and Sex, U.S., 1998



In 1998, COPD mortality increased significantly with age for all race-sex groups. It was highest in white males and lowest in black females at most ages.[29]

Asthma

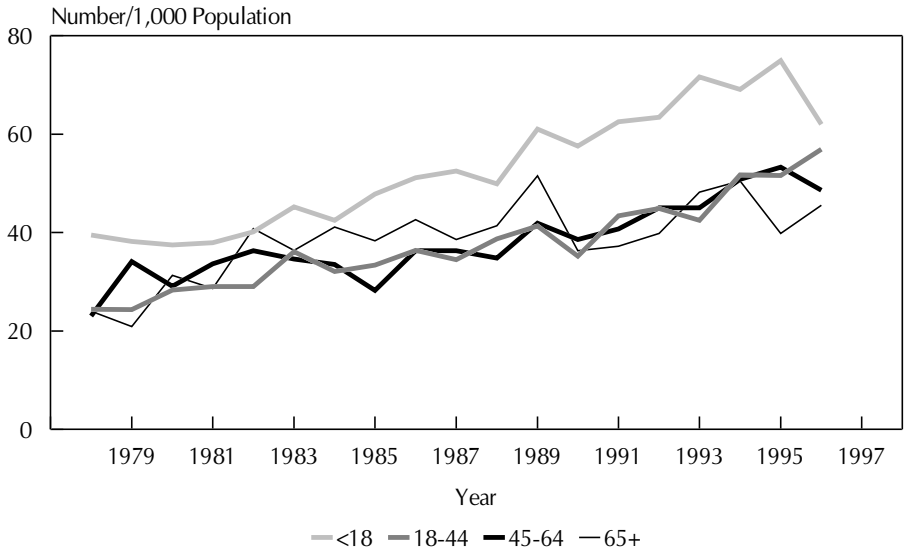
Chart 4-15
Prevalence of Asthma
by Age, U.S., 1970-1996



* Younger than age 17.

Between 1979 and 1994, the prevalence of asthma increased in all three age groups. From 1994 to 1996, it remained relatively stable at 14.6 million.[25, 40]

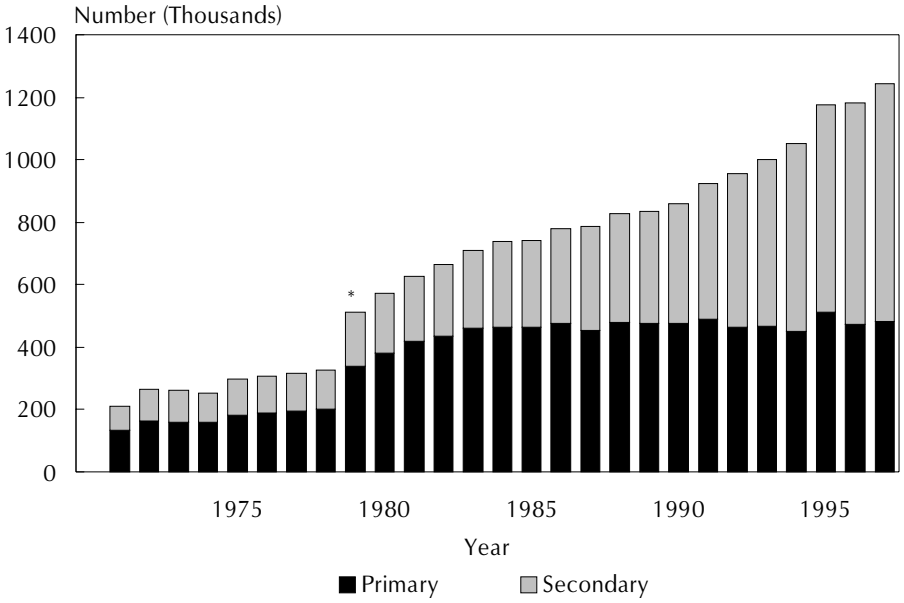
Chart 4-16
Prevalence Rate of Asthma
by Age, U.S., 1978-1996



Between 1978 and 1996, the prevalence rate of asthma tended to increase in most age groups, especially among those younger than age 18.[25, 40]

Asthma

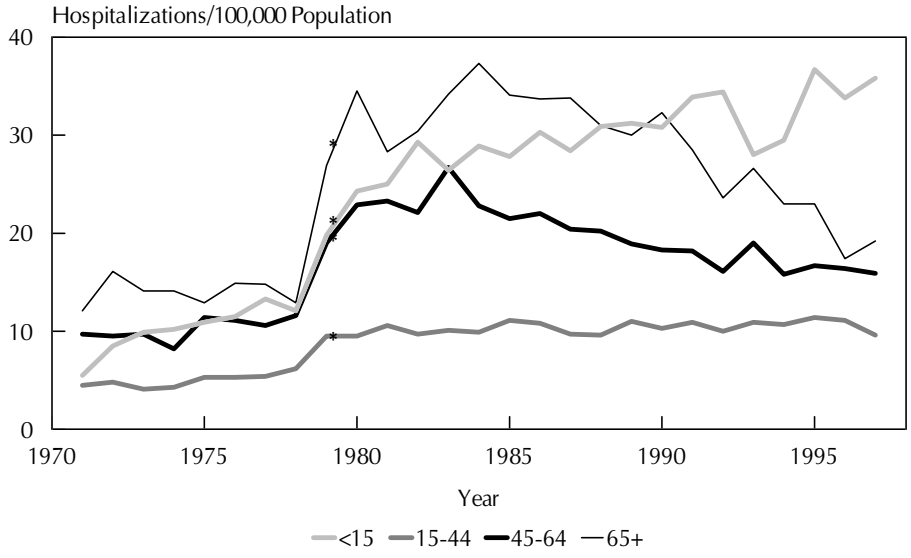
Chart 4-17
Hospitalizations for Asthma, U.S., 1971-1997



Hospitalizations with asthma as the primary diagnosis increased during the 1970s into the mid-1980s and then remained fairly constant. However, hospitalizations with asthma as a secondary diagnosis increased steadily. By 1997, over 1.2 million hospitalizations had asthma as either a primary or secondary diagnosis.[38]

* The sudden increase in the number of hospitalizations is most likely due to the revision in the ICD.

Chart 4-18
Hospitalization Rates for Asthma by Age, U.S., 1971-1997

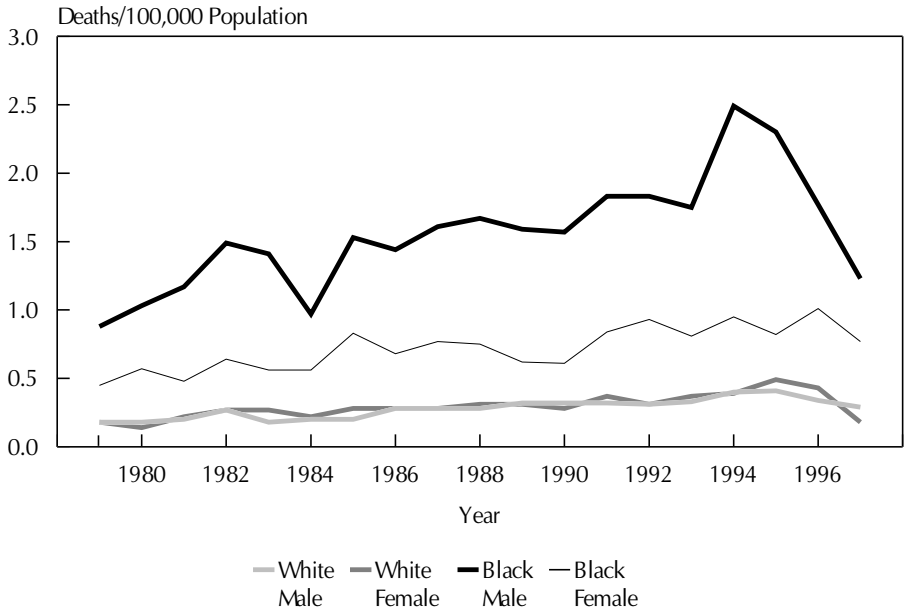


In the 1970s, hospitalization rates for asthma increased modestly for all ages. Since then, they increased for age <15, remained relatively stable for age 15-44, and declined for age 45+.[38]

* The sudden increase in the hospitalization rates is most likely due to the revision in the ICD.

Asthma

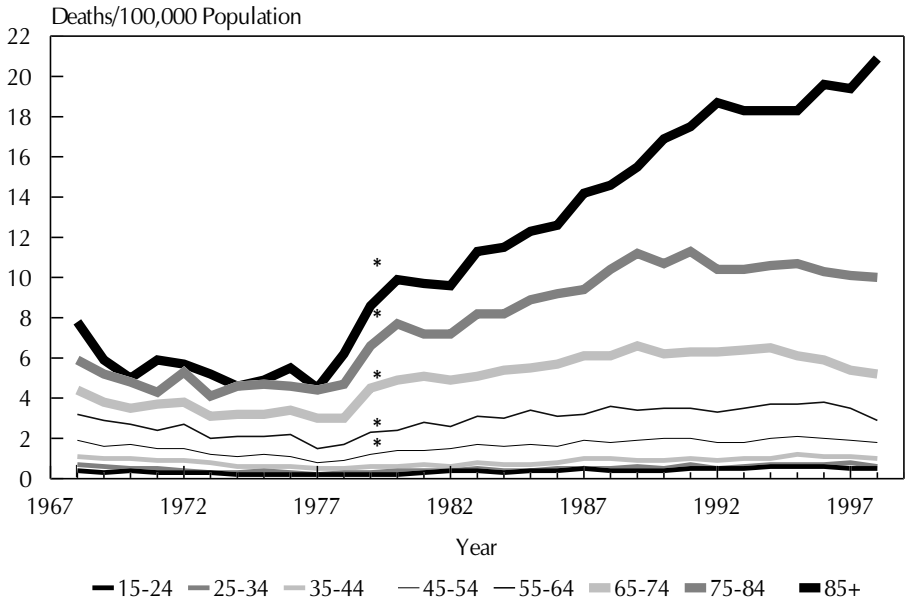
Chart 4-19
Age-Adjusted Death Rates* for Asthma
by Race and Sex, Age 1-24, U.S., 1979-1997



* Age-adjusted to the 2000 standard.

Although asthma death rates fluctuated between 1979 and 1997, they tended to increase for each race-sex group, age 1-24.[15, 22, 29]

Chart 4-20
Death Rates for Asthma
by Age, U.S., 1968-1998

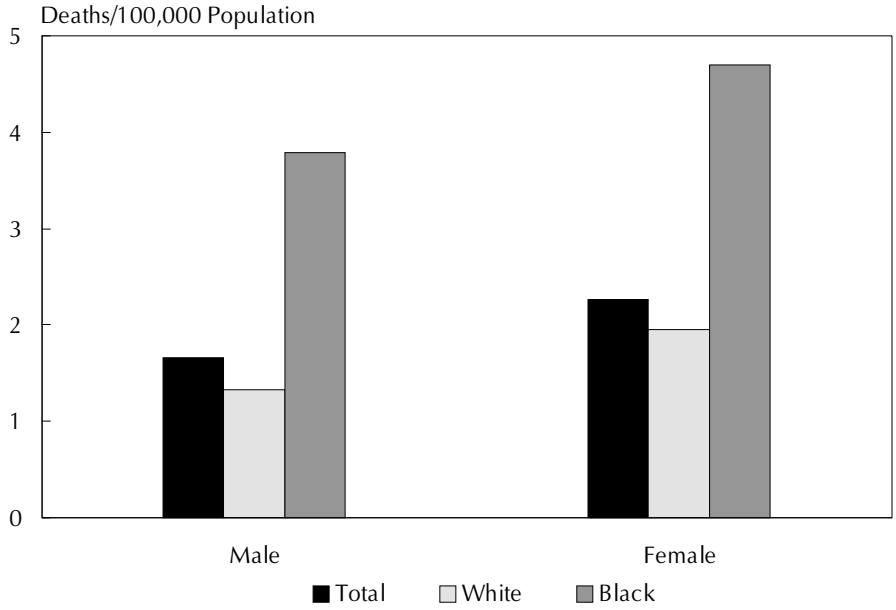


* The sudden increase in death rates is most likely due to the revision in the ICD.

Asthma mortality declined from 1968 to the late 1970s and then increased at all ages through the late 1980s. From then on it remained relatively constant for all ages except for 85+, where the rate continued to increase.[15, 22, 29]

Asthma

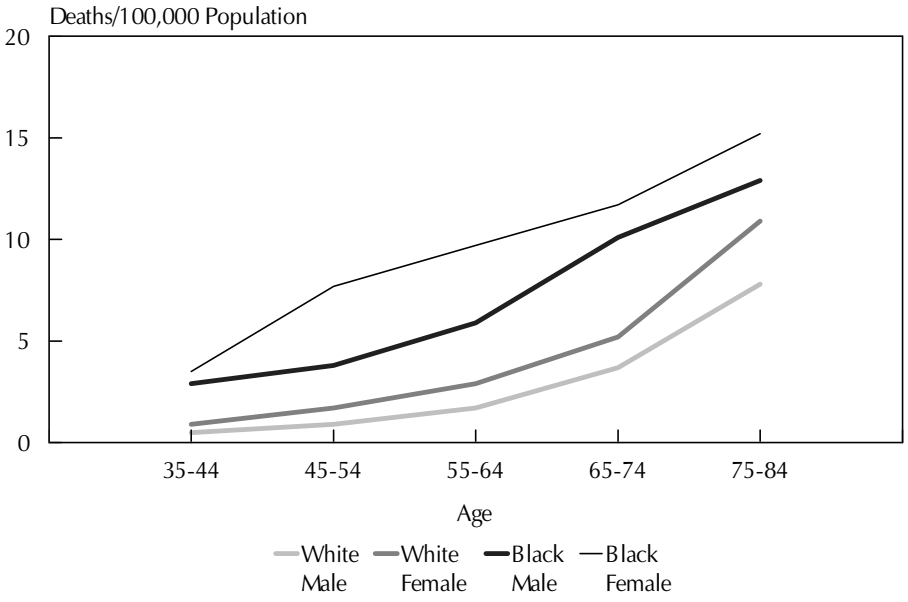
Chart 4-21
Age-Adjusted Death Rates* for Asthma
by Race and Sex, U.S., 1998



In 1998, asthma mortality was nearly 3 times higher in black males than in white males, 2.5 times higher in black females than in white females, and one-fourth higher overall in females than in males.[29]

* Age-adjusted to the 2000 standard.

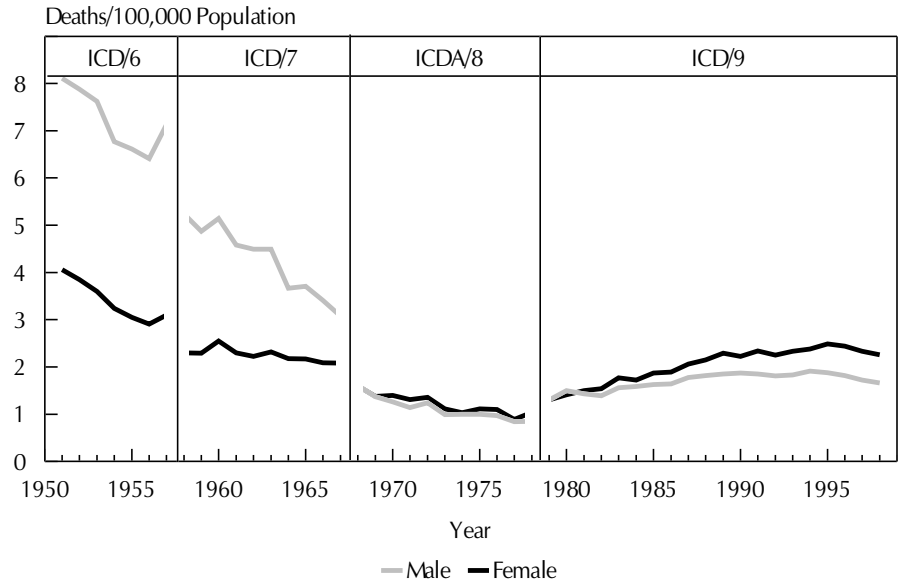
Chart 4-22
Death Rates for Asthma
by Age, Race, and Sex, U.S., 1998



In 1998, asthma mortality was much higher in blacks than in whites at each age. Within both race groups, it was higher in females than in males.[29]

Asthma

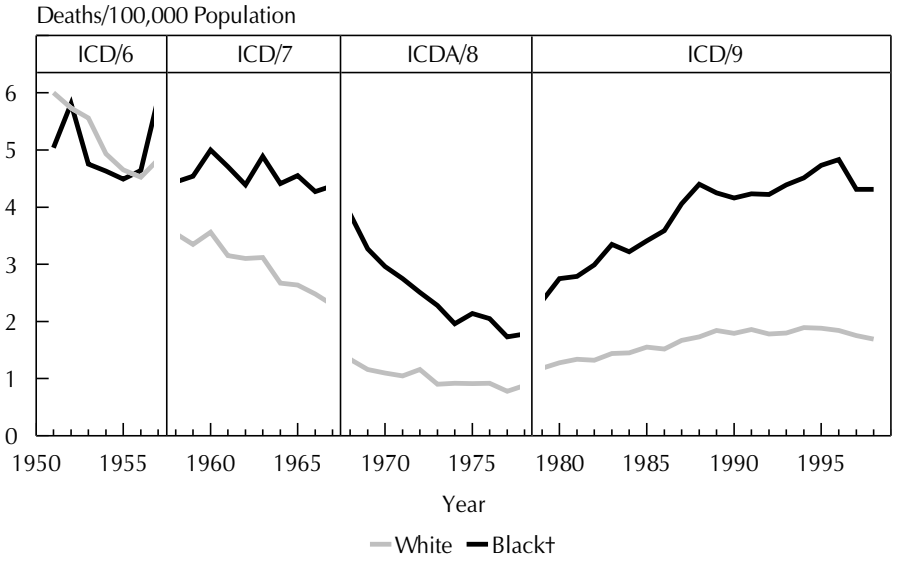
Chart 4-23
Age-Adjusted Death Rates* for Asthma
by Sex, U.S., 1951-1998



Asthma mortality declined from 1950 to 1978 and then began to increase. Rates were much higher in males than in females before the mid-1960s, but then became higher in females than in males.[15, 22, 29]

* Age-adjusted to the 2000 standard.
Note: Sudden changes in the rates are most likely due to revisions to the ICD.

Chart 4-24
Age-Adjusted Death Rates* for Asthma
by Race, U.S., 1951-1998

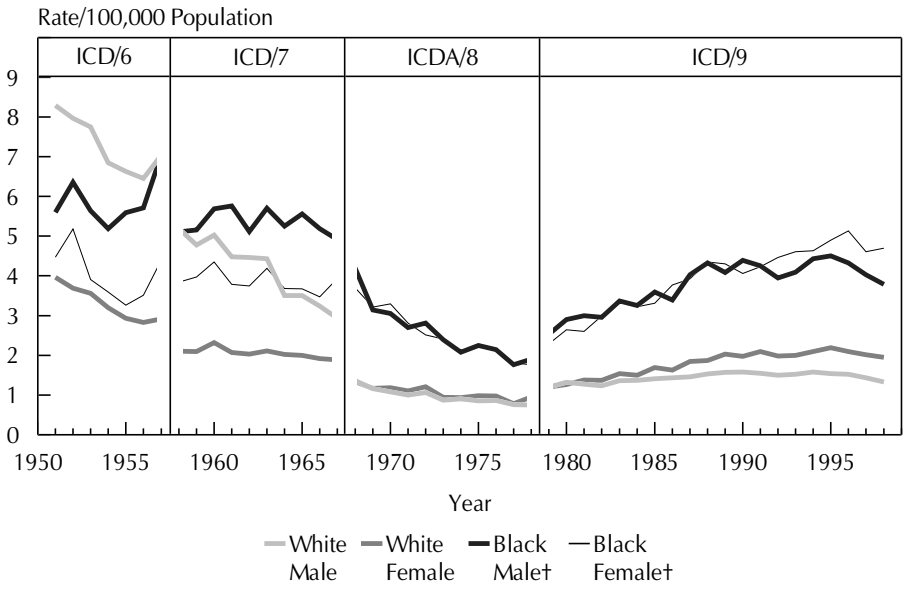


Since 1978, the black-white gap in asthma mortality has become wider, with the rate much higher in blacks than in whites.[15, 22, 29]

* Age-adjusted to the 2000 standard.
† Nonwhite from 1951 to 1967.
Note: Sudden changes in the rates are most likely due to revisions to the ICD.

Asthma

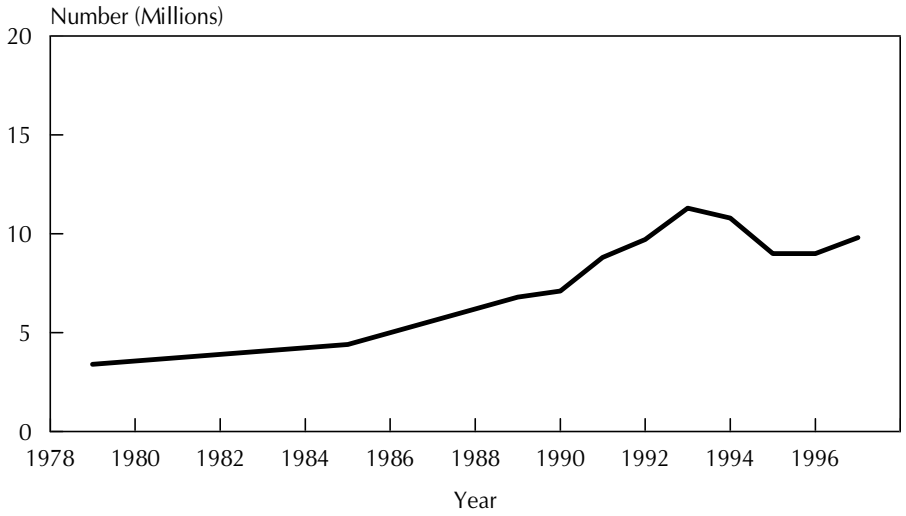
Chart 4-25
Age-Adjusted Death Rates* for Asthma
by Race and Sex, U.S., 1951-1998



Since 1970, trends in asthma mortality are much more similar for males and females within age groups. The rates, however, are higher for blacks than for whites.[15, 22, 29]

* Age-adjusted to the 2000 standard.
† Nonwhite from 1950 to 1967.
Note: Sudden changes in the rates are most likely due to revisions to the ICD.

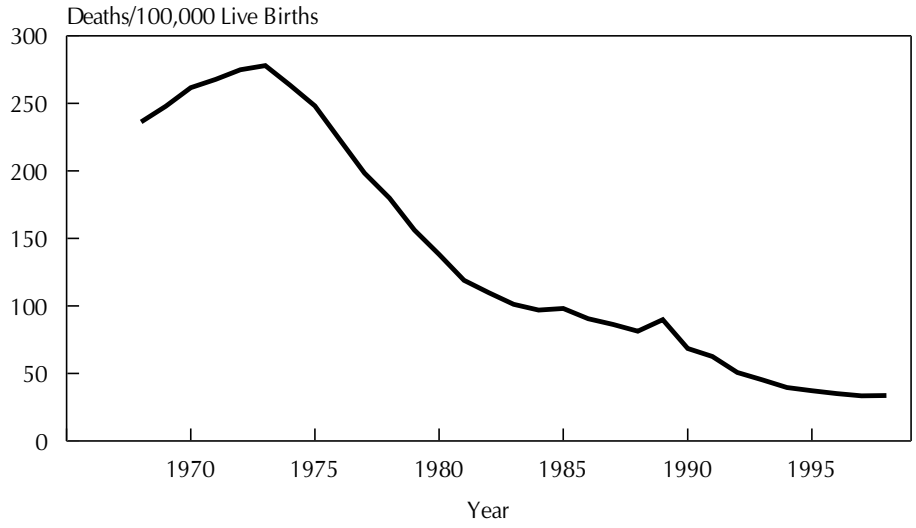
Chart 4-26
Physician Office Visits for Asthma,
U.S., 1979-1997



Between 1979 and 1993, the number of physician office visits for asthma increased substantially, followed by an irregular decline.[34, 42]

Neonatal Respiratory Distress Syndrome

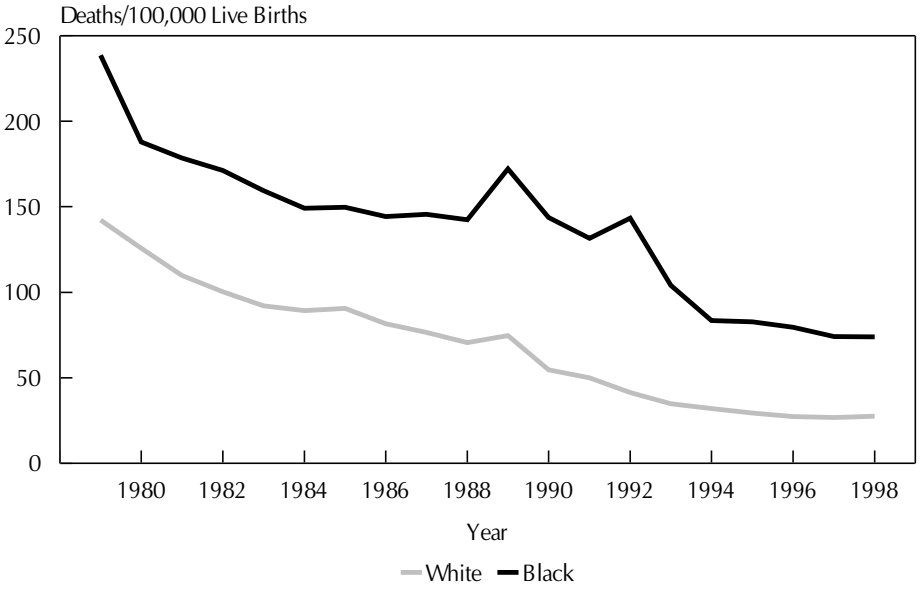
Chart 4-27
Infant Mortality Rate* for Respiratory Distress Syndrome, U.S., 1968-1998



Infant mortality for RDS declined steeply from 1974 to 1981, followed by a slower but appreciable decline.[15, 22, 28]

* Under age 1.

Chart 4-28
Infant Mortality Rate* for Respiratory Distress Syndrome by Race, U.S., 1979-1998



While the decrease in infant mortality for RDS has been appreciable in both blacks and whites during the past 20 years, a black-white gap still remained in 1998.[15, 28]

* Under age 1.

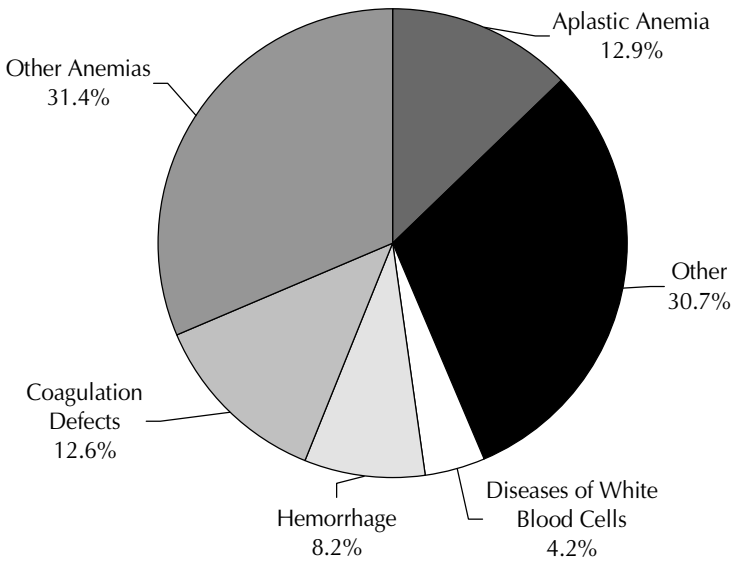
5. Blood Diseases

In this chapter, the diagnostic group *blood diseases* is used to mean only those diagnostic categories listed in the ICD chapter on "Diseases of the Blood and Blood-Forming Organs" (Chart 5-1).

Blood clotting diseases, most of which are subsumed under CVD, are not included, nor are other blood diseases such as bleeding and red blood disorders of the newborn or serum hepatitis. Blood transfusion and resources statistics are also not included.

Chart 5-2 contains a list of blood diseases along with the ninth revision ICD codes. It also includes 1997 estimates of hospital discharges, durations of stay, physician office visits, and deaths for these diagnostic categories. Subsequent graphs display morbidity and mortality for aplastic anemia and sickle cell anemia. In addition to the usual data limitations, the numbers on which these statistics are based are quite small. For this reason, some of the graphs on mortality represent combined data from an 11-year period (1987 through 1997).

Chart 5-1
Blood Disease Deaths,
Percent by Subgroup, U.S., 1997



Total Deaths = 10,251 (100%)

Blood Diseases

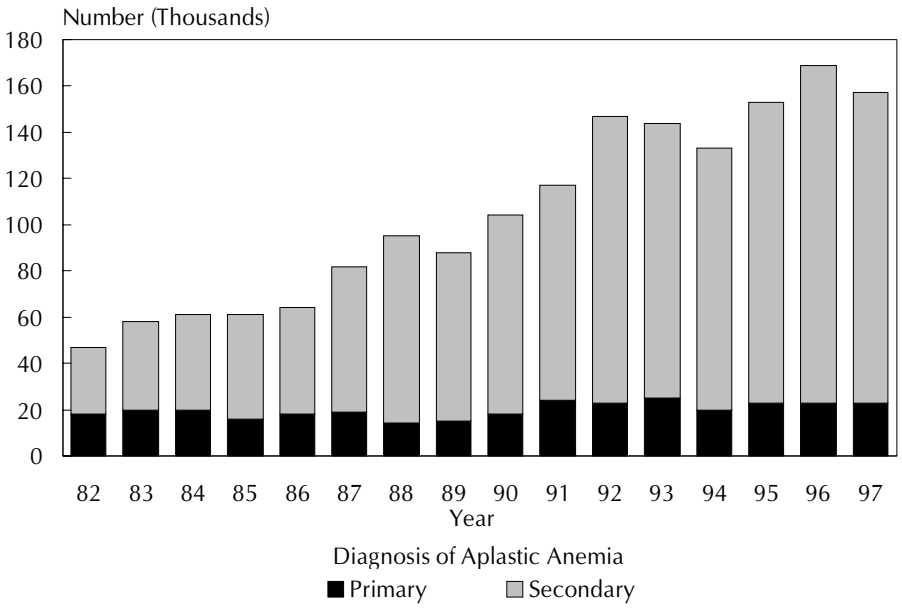
Chart 5-2
Number of Hospitalizations, Physician Office Visits, and Deaths for Selected Blood Diseases, U.S., 1997

Diagnostic Category	ICD/9 Codes	Hospitalizations: First-Listed Discharge (000)	Hospitalizations: Length of Stay (Days)	Physician Office Visits (000)	Deaths
Blood diseases—total*	280-289	373	5.2	3,526	10,251
Anemias—total	280-285	239	5.2	2,484	4,471
Iron deficiency anemia	280	53	4.7	237	107
Other deficiency anemia	281	7	9.0	514	184
Cooley's anemia	282.4	0	0.0	0	32
Sickle cell anemia	282.6	62	5.8	149	440
Aplastic anemia	284	23	5.1	38	1,323
Other and unspecified anemias	Residual	94	4.7	1,546	2,385
Coagulation defects	286	22	5.8	110	1,294
Hemophilia: factor VII	286.0	0	0.0	0	76
Hemophilia: factor IX	286.1	0	0.0	0	5
Other	Residual	22	5.8	110	1,213
Purpura and other hemorrhagic conditions	287	35	5.0	253	840
Primary thrombocytopenia	287.3	18	5.0	38	322
Secondary thrombocytopenia	287.4	0	0.0	0	8
Other	Residual	17	5.0	215	510
Diseases of white blood cells	288	52	5.6	220	430
Other diseases of blood and blood-forming organs	289	25	4.0	459	3,216

* Includes diseases in the ICD chapter on Diseases of Blood and Blood-Forming Organs.
Note: Estimates of hospitalizations and physician office visits are subject to sampling variability. Estimates of hospitalizations below 50,000 have a relative standard error of more than 11 percent. Estimates of physician office visits below 588,000 have a relative standard error of more than 30 percent.
Compiled from references 15, 34-35.

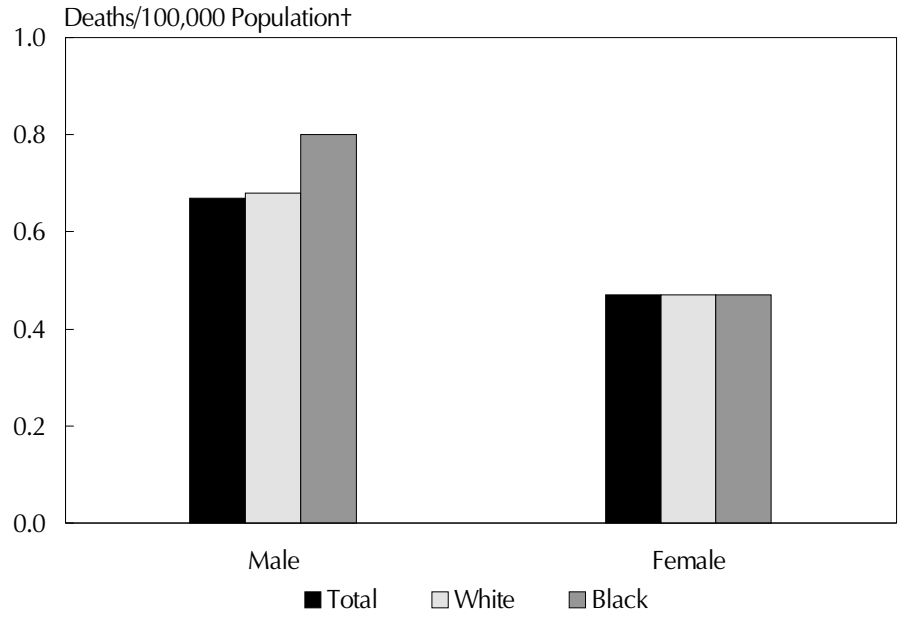
Anemias

Chart 5-3
Hospitalizations for Aplastic Anemia, U.S., 1982-1997



Between 1982 and 1997, the number of hospitalizations with a primary or secondary diagnosis of aplastic anemia tripled. All of the increase was due to aplastic anemia as a secondary diagnosis.[38]

Chart 5-4
Age-Adjusted Death Rates* for Aplastic Anemia by Race and Sex, U.S., 1987-1997

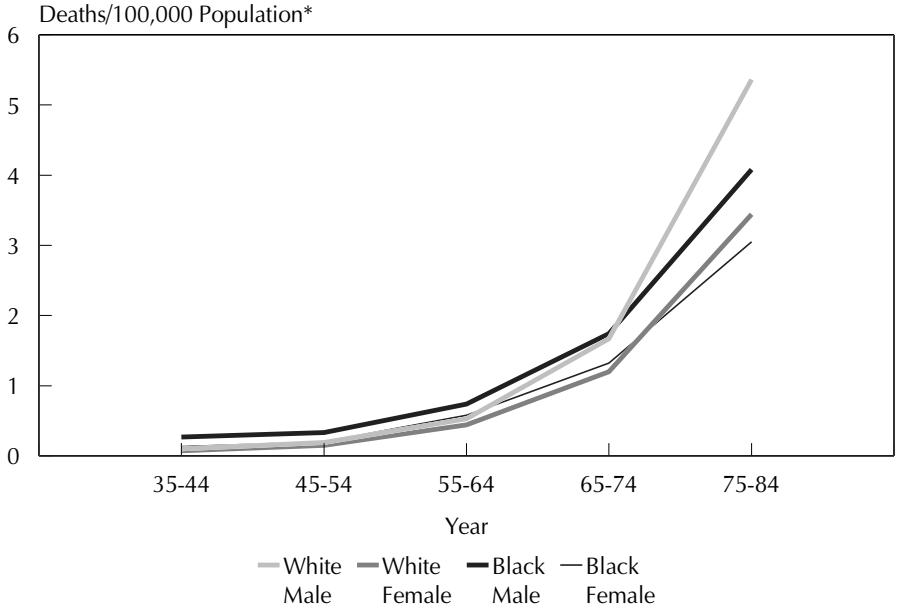


* Age-adjusted to the 2000 standard.
† Average annual rates.

Mortality from aplastic anemia is higher in males than in females. Within sex groups, it is higher for black males than for white males and identical for white females and black females.[15]

Anemias

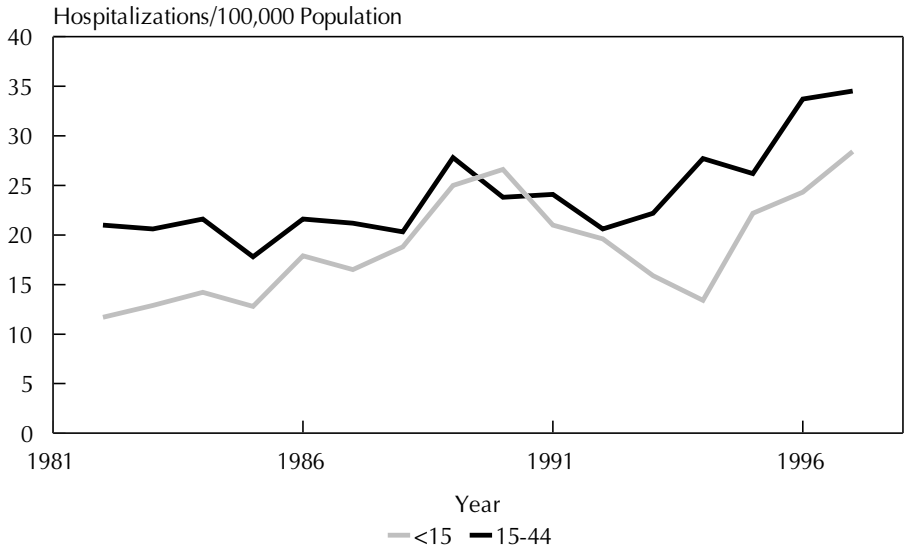
Chart 5-5
Death Rates for Aplastic Anemia
by Age, Race, and Sex, U.S., 1987-1997



Within race groups, for all ages, the aplastic anemia death rate was higher in males than in females. At the younger ages, within sex groups, it was higher in blacks than in whites.[15]

* Average annual rates.

Chart 5-6
Hospitalization Rates for Sickle Cell Anemia
by Age, U.S., 1982-1997

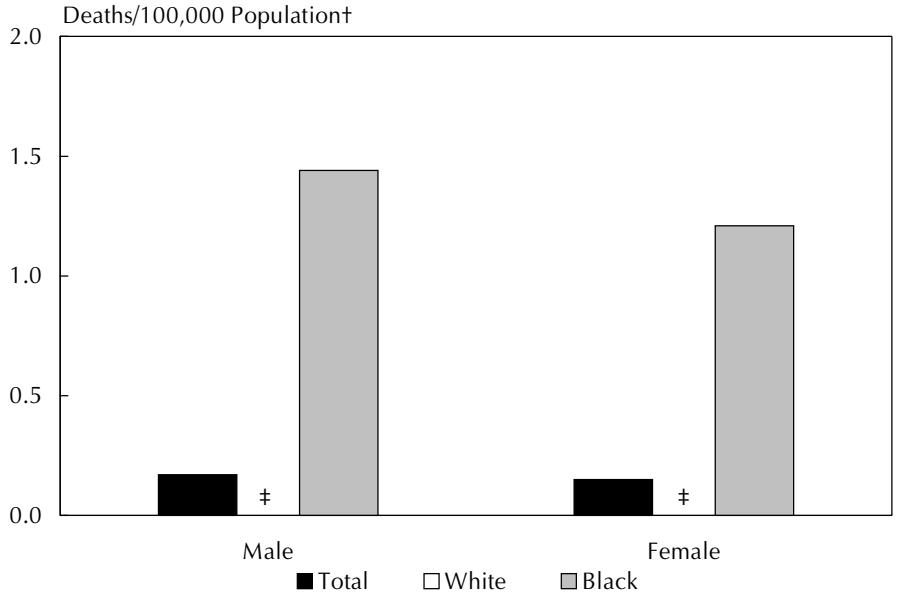


Although the hospitalization rate for sickle cell anemia varied considerably between 1982 and 1997, overall, it increased for both age groups.[15]

Note: All discharges for this disease are assumed to be in the black population.

Anemias

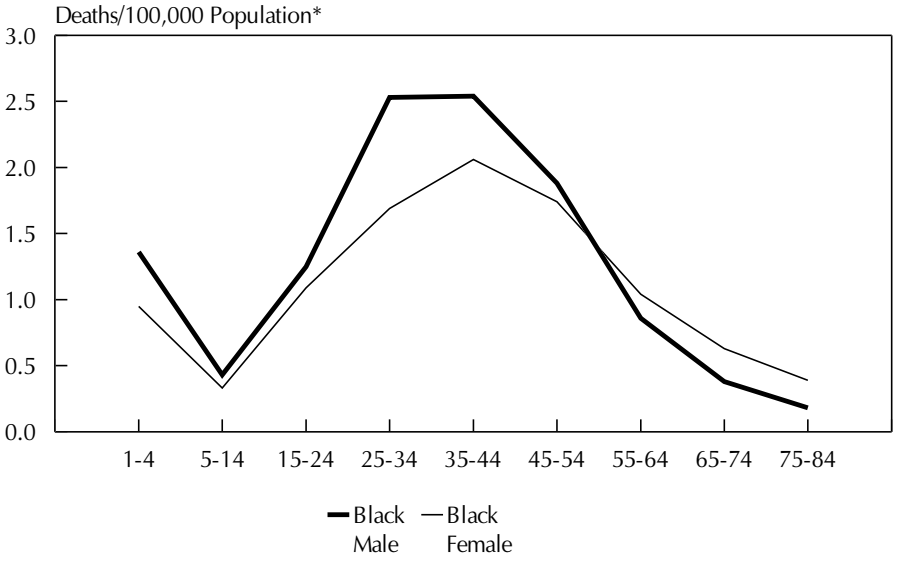
Chart 5-7
Age-Adjusted Death Rates* for Sickle Cell Anemia
by Race and Sex, U.S., 1987-1997



* Age-adjusted to the 2000 standard.
† Average annual rates.
‡ Rates for white males and females are less than 1/2 of 1 percent.

Mortality from sickle cell anemia occurs predominantly in blacks, with males having a slightly higher death rate than females.[15]

Chart 5-8
Death Rates for Sickle Cell Anemia
by Age and Sex in Blacks, U.S., 1987-1997



* Average annual rates.

Between 1987 and 1997, the trends in sickle cell mortality were relatively similar for males and for females; the rates were higher for those younger than age 4 and for those between 15 and 64.[15]

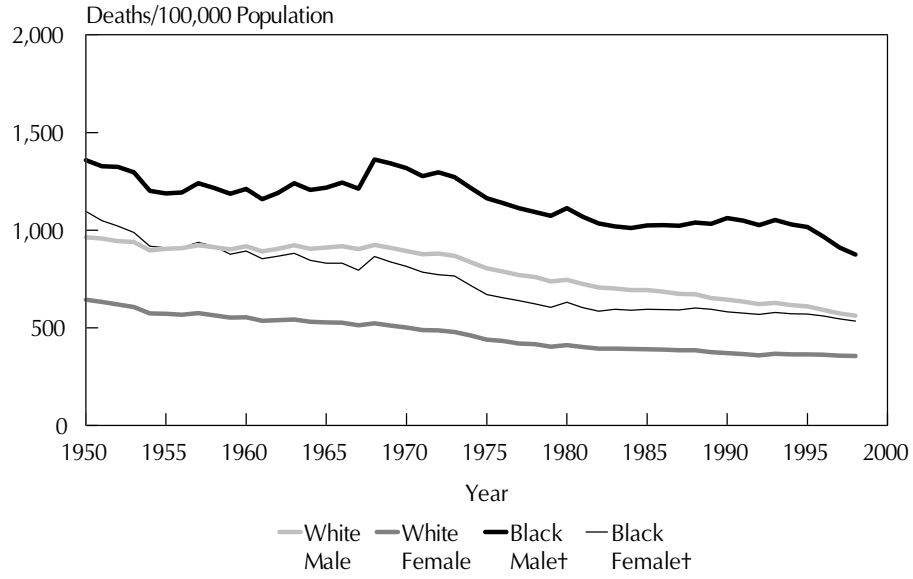
6. Death Rates Adjusted to the 1940 Standard

In keeping with an agreement between the NHLBI and the DHHS, the Institute has included age-adjusted mortality charts based on the 1940 standard. Each one of the charts in this chapter corresponds to a chart based on the 2000 age-adjustment standard in Chapters 2, 3, 4, or 5. To permit easy comparisons between figures age-adjusted to the 2000 standard and figures age-adjusted to the 1940 standard, identical chart numbers are used for corresponding charts, but with "(1940)" added to the latter group.

Most of the accompanying bullets in this chapter are identical to those associated with their corresponding charts, but a few may differ. The disparity that arises between a pair results from the inherent differences in the age-adjustment standards.

Death Rates Adjusted to the 1940 Standard

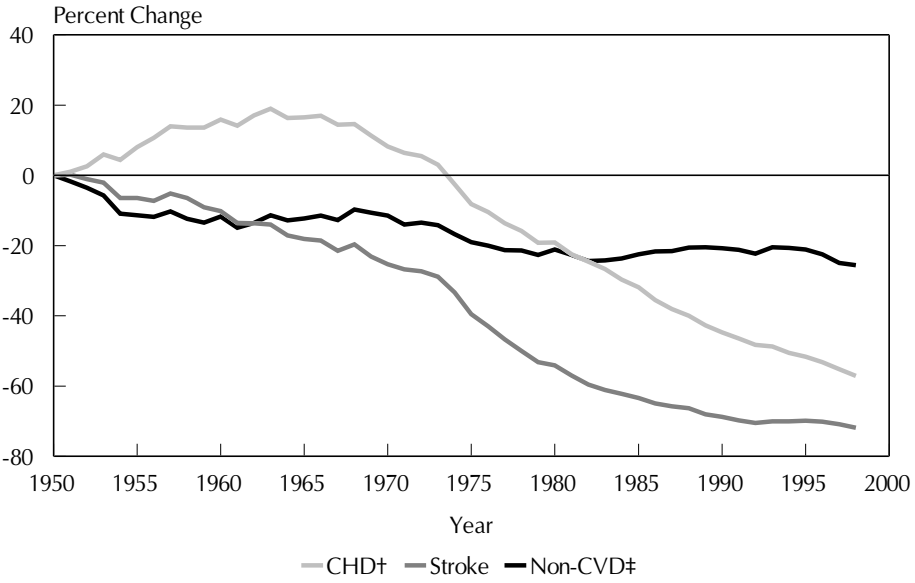
Chart 2-6 (1940)
Age-Adjusted Death Rates* for All Causes
by Race and Sex, U.S., 1950-1998



The all-cause death rates in males have declined over the past 30 years. The declines were more rapid in the 1970s than in the 1980s and 1990s. For women, the trend has been similar, even though the decline began much earlier.[15, 22, 29]

* Age-adjusted to the 1940 standard.
† Nonwhite from 1950 to 1967.

Chart 3-5 (1940)
Change in Age-Adjusted Death Rates*
Since 1950, U.S., 1950-1998



The CHD death rate increased 19% from its level in 1950 to a peak in 1963. By 1998, it was 57% lower than in 1950. The rate for stroke declined in most years so that by 1998 it was 72% lower than in 1950. The death rate for the non-cardiovascular causes of death was only 26% lower in 1998 than in 1950.[15, 22, 29]

* Age-adjusted to the 1940 standard.
† Comparability ratio applied to rates for years 1968-1978.
‡ Total mortality minus CVD (excluding congenital).

Death Rates Adjusted to the 1940 Standard

Chart 3-6 (1940)
Age-Adjusted Death Rates* and Percent Change for All Causes and Cardiovascular Diseases, U.S., 1963 and 1998

Cause of Death	Rate/100,000 Pop. 1963	1998	1963-1998 Difference	Percent Change	% Contribution to Total Decline
All causes	756.9	470.8	-286.1	-37.8	100
CVD†	388.6	161.4	-227.2	-58.5	79
CHD	220.3	79.4	-140.9	-64.0	49
Stroke	76.4	25.0	-51.4	-67.3	18
Other CVD	91.9	57.0	-34.9	-38.0	12
Non-CVD	368.3	309.4	-58.9	-16.0	21

* Age-adjusted to the 1940 standard.
† Excludes congenital anomalies of the circulatory system.

Between 1963 and 1998, the CVD death rate declined 59% compared with 16% for all non-CVD causes of death. Seventy-nine percent of the total mortality decrease was due to the decline in CVD. CHD and stroke mortality declined 64% and 67%, respectively.[15, 22, 29]

Chart 3-7 (1940)
Average Annual Percent Change in Age-Adjusted Death Rates* for All Causes and Cardiovascular Diseases, U.S., 1965-1998

Period	All Causes	Total CVD†	CHD‡	Stroke	Other CVD	All Other Causes
1965-1970	-0.6	-1.5	-1.5	-1.7	-1.2	+0.3
1970-1975	-2.3	-3.1	-3.1	-3.8	-2.4	-1.6
1975-1980	-1.7	-2.8	-2.7	-5.6	-1.2	-0.7
1980-1985	-1.2	-2.4	-3.3	-4.4	+0.5	-0.4
1985-1990	-1.0	-3.3	-4.0	-3.1	-2.3	+0.5
1990-1995	-0.5	-1.4	-2.6	-0.6	-0.1	0.0
1995-1998	-2.3	-2.8	-4.0	-2.1	-1.3	-2.1

* Age-adjusted to the 1940 standard.
† Excludes congenital anomalies of the circulatory system.
‡ Comparability ratio applied to rates for 1968-1978.

Declines in CVD mortality have continued since 1965. Average annual percent declines between 1995 and 1998 were 2.8% for CVD, 4.0% for CHD, and 2.1% for stroke.[15, 22, 29]

Declines are generally greater than when rates were age-adjusted with the 2000 standard.

Death Rates Adjusted to the 1940 Standard

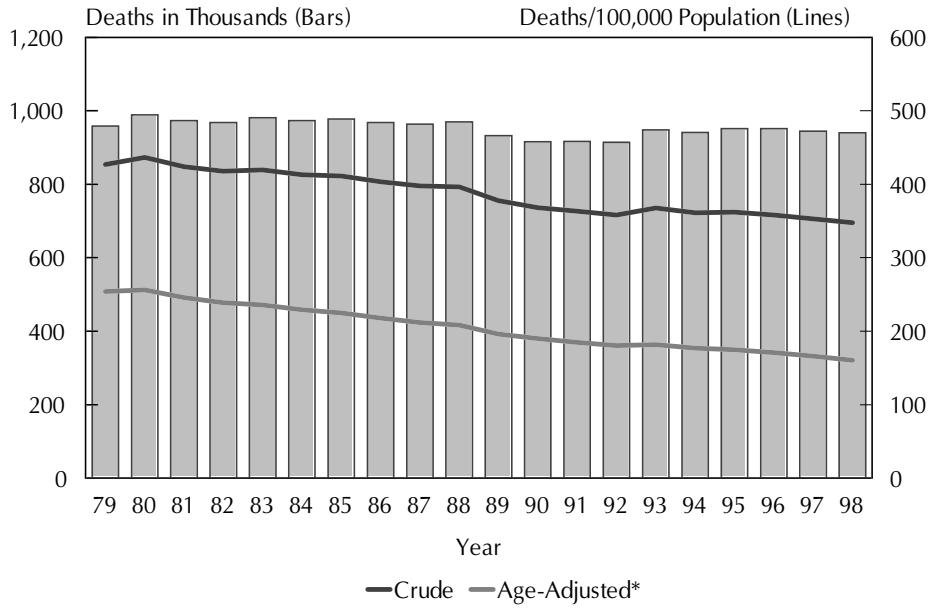
Chart 3-8 (1940)
Average Annual Percent Change in Age-Adjusted Death Rates* for All Causes and Cardiovascular Diseases by Race and Sex, U.S., 1990-1998

	Total	White Male	White Female	Black Male	Black Female
All causes	-1.1	-1.6	-0.3	-2.3	-0.9
CVD†	-1.9	-2.4	-1.5	-2.2	-1.6
Heart disease	-2.2	-2.6	-1.8	-2.3	-1.0
CHD	-3.0	-3.3	-2.7	-2.8	-2.3
CHF †	+1.3	+1.1	+1.9	-1.0	0.0
Stroke	-0.8	-1.1	-0.5	-2.0	-1.5
All non-CVD	-0.7	-1.1	+0.3	-2.3	-0.5

* Age-adjusted to the 1940 standard.
† 1990-1997.

Between 1990 and 1998, declines in CVD and CHD mortality were greater in males than in females and greater in white males than in black males. For females, the decline in CVD mortality was slightly greater in blacks than in whites, and for CHD, it was higher in whites than in blacks. For stroke, the declines were greater in blacks than in whites.[15, 22, 29]

Chart 3-9 (1940)
Deaths and Death Rates for Major Cardiovascular Diseases, U.S., 1979–1998



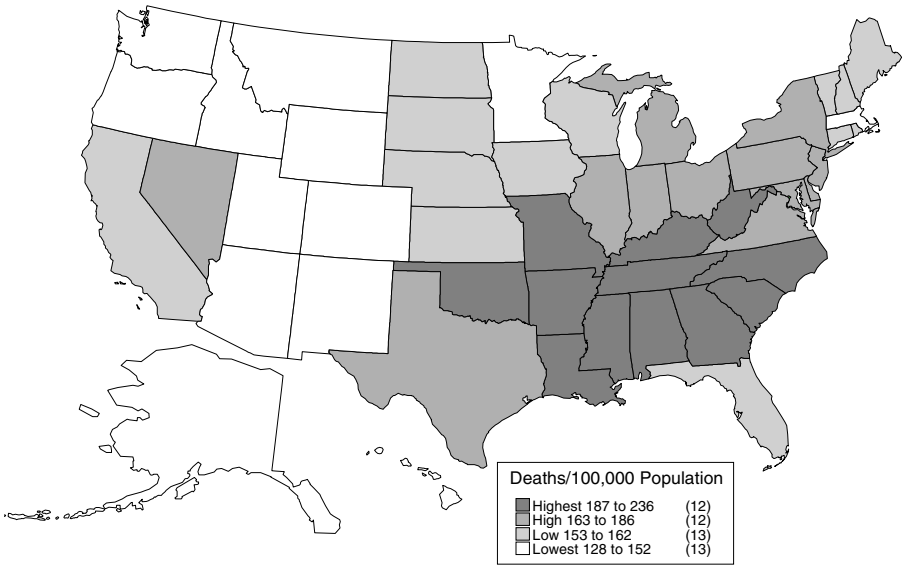
CVD death rates, crude and adjusted, declined considerably between 1979 and 1998, despite only a very modest decline in the total number of CVD deaths.[15, 22, 29]

When the 2000 standard was used, the line for the crude rate is lower than the line for the age-adjusted rate.

* Age-adjusted to the 1940 standard.
Note: ICD codes 390-448. Total CVD would include about 10,000 more deaths each year.

Death Rates Adjusted to the 1940 Standard

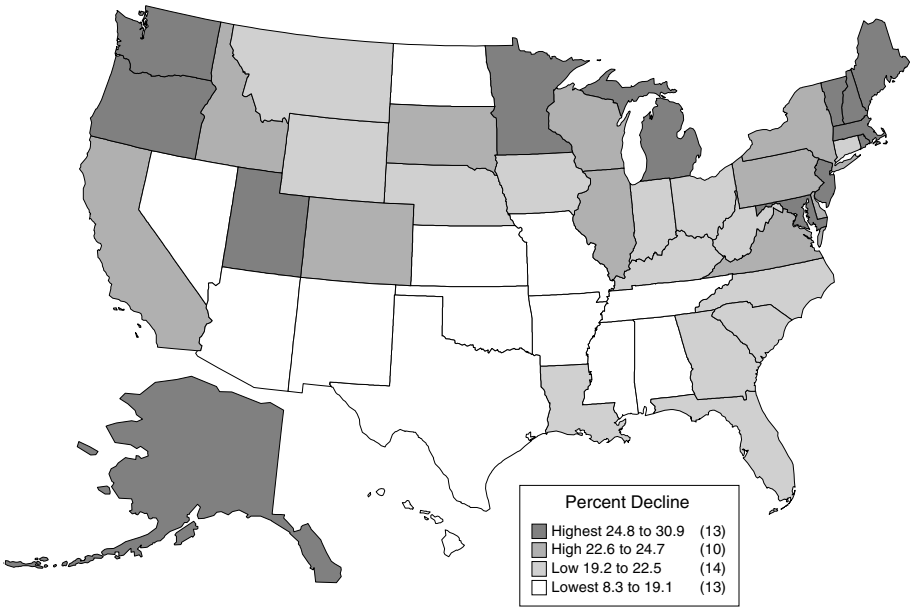
Chart 3-11 (1940)
Age-Adjusted Death Rates* for Cardiovascular Diseases by State, U.S., 1995-1997



The highest CVD death rates tended to be in the Southeast and the lowest in the West.[15]

* Age-adjusted to the 1940 standard.

Chart 3-12 (1940)
Percent Decline in Age-Adjusted Death Rates* for Cardiovascular Diseases by State, U.S., 1985-87 to 1995-97

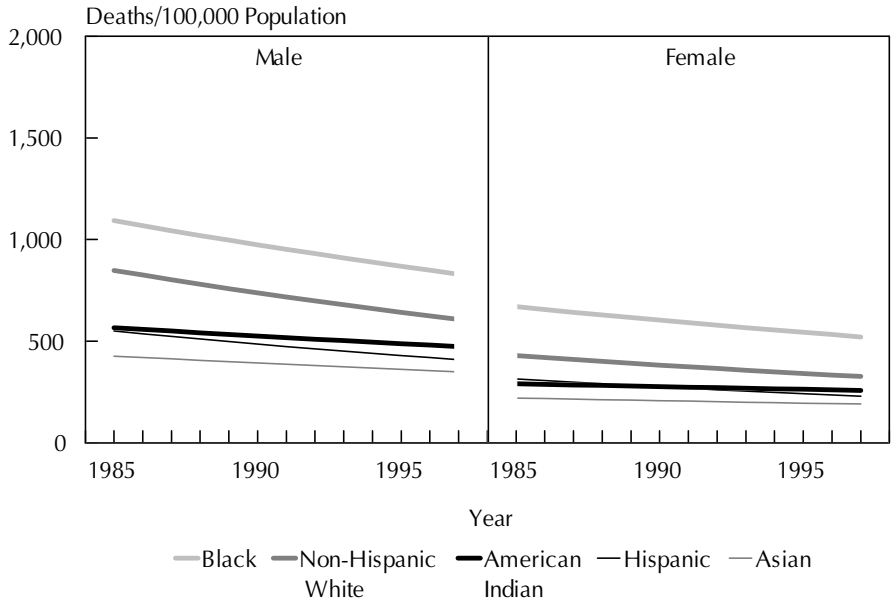


Between 1985-87 and 1995-97, the percent decline in CVD mortality tended to be the greatest in the northern coastal states and least in the central southern states.[15]

* Age-adjusted to the 1940 standard.

Death Rates Adjusted to the 1940 Standard

Chart 3-13 (1940)
Age-Adjusted Death Rates* for Heart Disease by Race/Ethnicity and Sex, Age 45+, U.S., 1985-1997

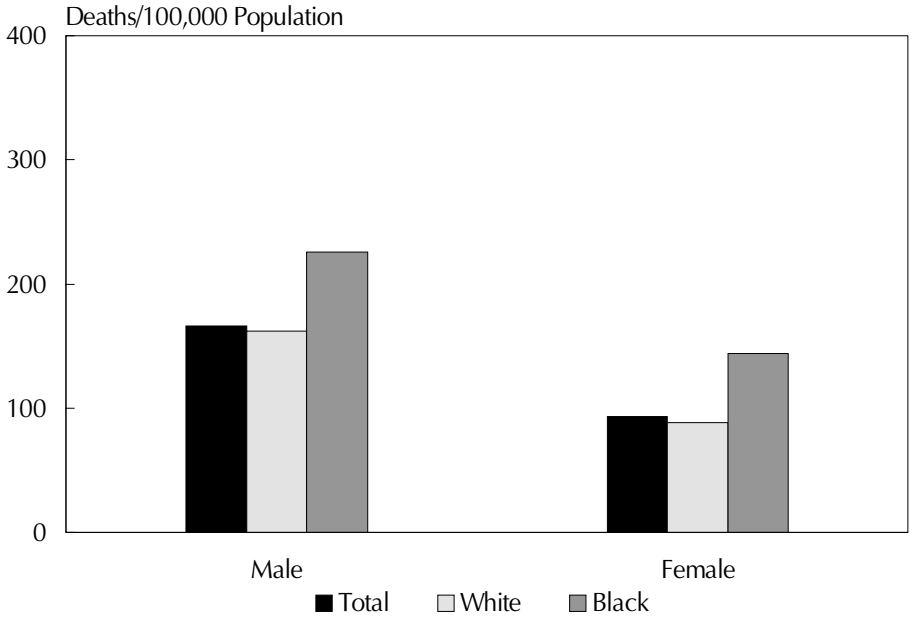


* Age-adjusted to the 1940 standard.
Note: Each line is a log linear regression derived from the actual rates.

Between 1985 and 1997, heart disease death rates for males and females, age 45+, declined in all race/ethnic groups: blacks, whites, American Indians, Asians, and Hispanics.[12]

The modest decline in mortality for Asian females differs from the modest increase that resulted when the 2000 age-adjustment standard was used.

Chart 3-14 (1940)
Age-Adjusted Death Rates* for Heart Disease by Race and Sex, U.S., 1998



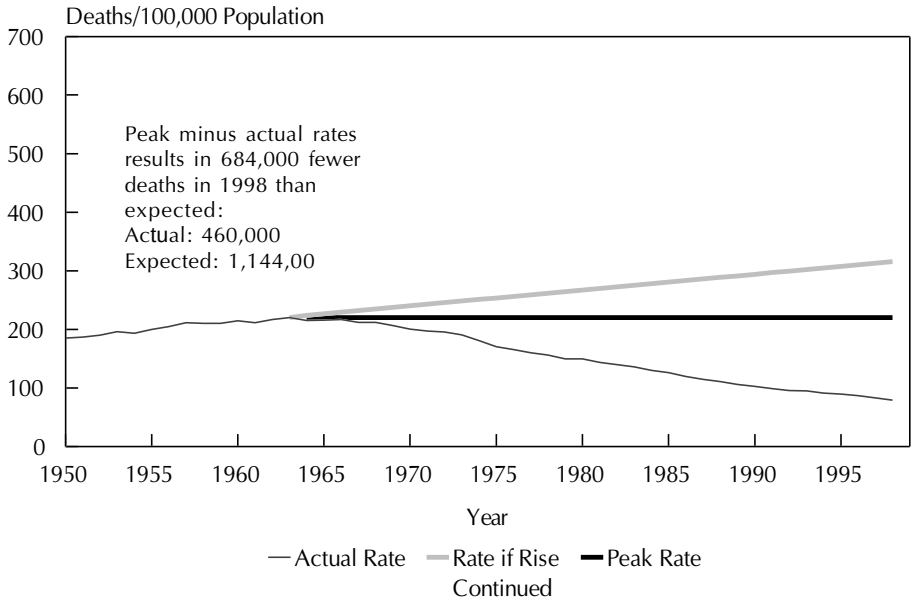
* Age-adjusted to the 1940 standard.

In 1998, heart disease mortality was 40% higher in black males than in white males, 63% higher in black females than in white females, and 78% higher in males than in females.[29]

The differences are much less when rates were age-adjusted to the 2000 standard.

Death Rates Adjusted to the 1940 Standard

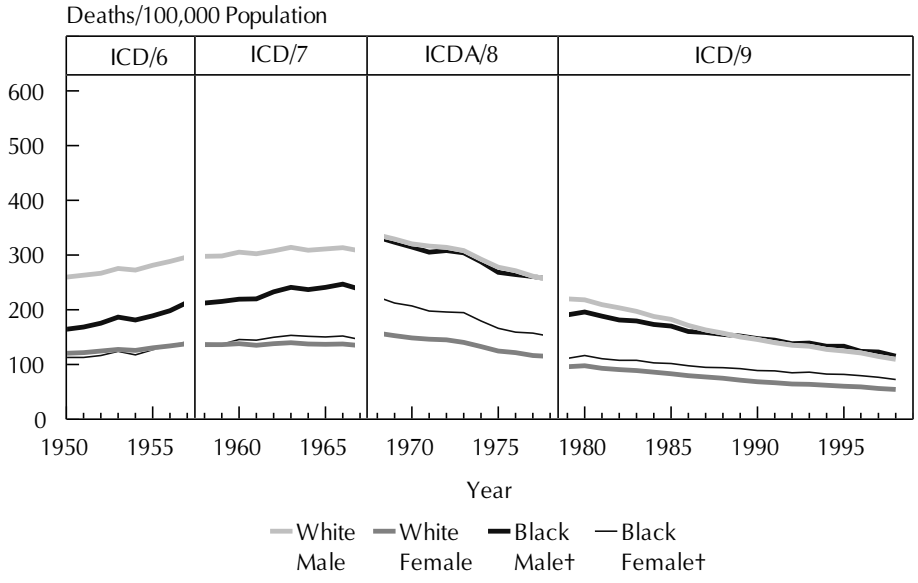
Chart 3-23 (1940)
Age-Adjusted Death Rates* for Coronary Heart Disease, Actual and Expected, U.S., 1950-1998



CHD accounted for 460,000 deaths in 1998. It would have accounted for 1,144,000 deaths if the rate had remained at its 1963 peak.[8, 15, 22, 29]

* Age-adjusted to the 1940 standard.
Note: Comparability ratio applied to rates for 1968-1978.

Chart 3-24 (1940)
Age-Adjusted Death Rates* for Coronary Heart Disease by Race and Sex, U.S., 1950-1998

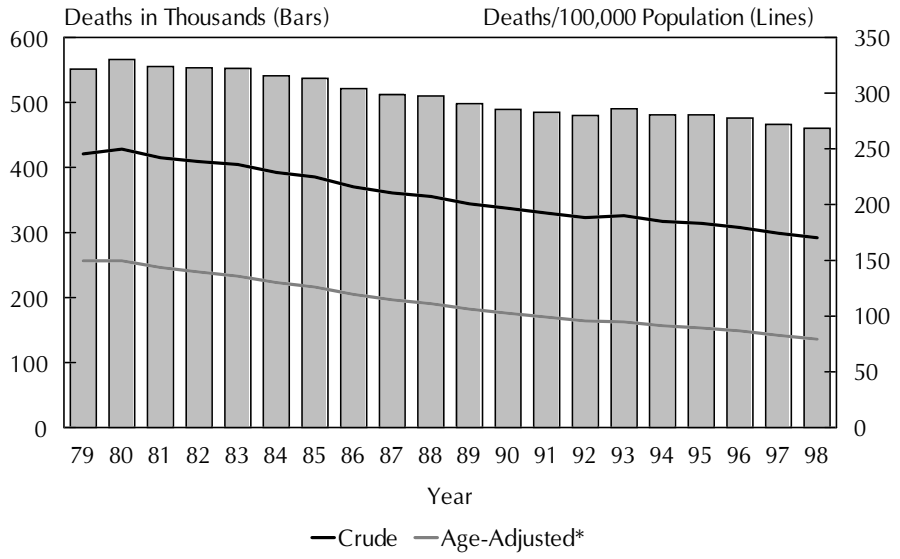


CHD death rates initially increased and then decreased for each race-sex group between 1950 and 1998. From 1979 to 1998, within sex groups, the rates were steeper in whites than in blacks.[15, 22, 29]

* Age-adjusted to the 1940 standard.
† Nonwhite from 1950 to 1967.

Death Rates Adjusted to the 1940 Standard

Chart 3-25 (1940)
Deaths and Death Rates for Coronary Heart Disease, U.S., 1979-1998



Since 1980, the crude and age-adjusted death rates and the number of deaths for CHD have decreased.[2, 22, 29]

When the 2000 standard was used, the line for the crude rate is lower than the line for the age-adjusted rate.

* Age-adjusted to the 1940 standard.

Chart 3-26 (1940)
Average Annual Percent Change in Age-Adjusted Death Rates* for Coronary Heart Disease by Race and Sex, U.S., 1963-1998

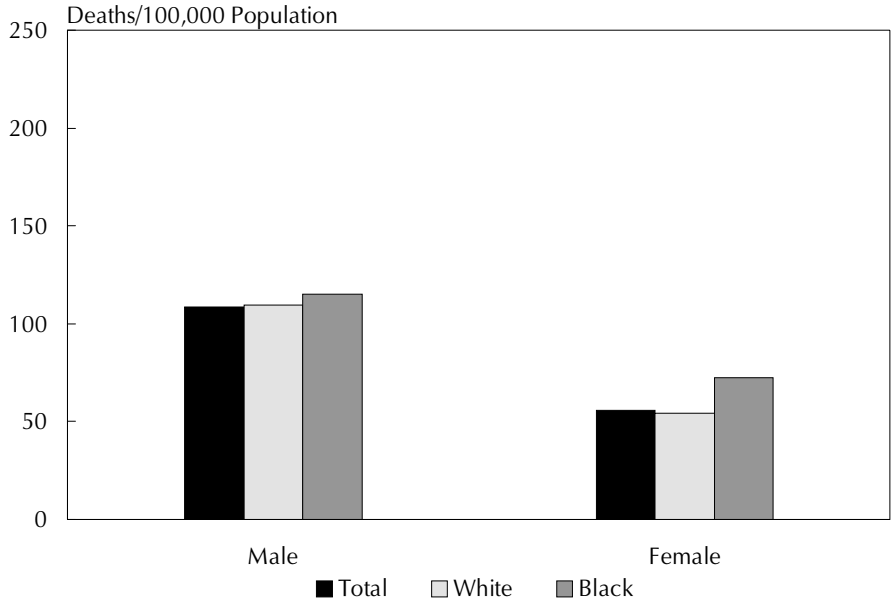
Period	Total Pop.	White Male	White Female	Black Male	Black Female
1963-1967	-0.7	-0.3	-0.8	-0.1	-0.8
1968-1978	-3.1	-2.8	-3.3	-2.7	-3.9
1979-1990	-3.6	-3.9	-3.2	-2.6	-2.3
1990-1995	-2.6	-3.0	-2.5	-2.1	-1.8
1995-1998	-4.0	-4.2	-3.5	-4.5	-3.9

* Age-adjusted to the 1940 standard.

In the 1960s and 1970s, within race groups, females had steeper declines in CHD mortality than males. Since 1979, however, within race groups, the declines have been steeper for males than for females.[15, 22, 29]

Death Rates Adjusted to the 1940 Standard

Chart 3-28 (1940)
Age-Adjusted Death Rates* for Coronary Heart Disease
by Race and Sex, U.S., 1998

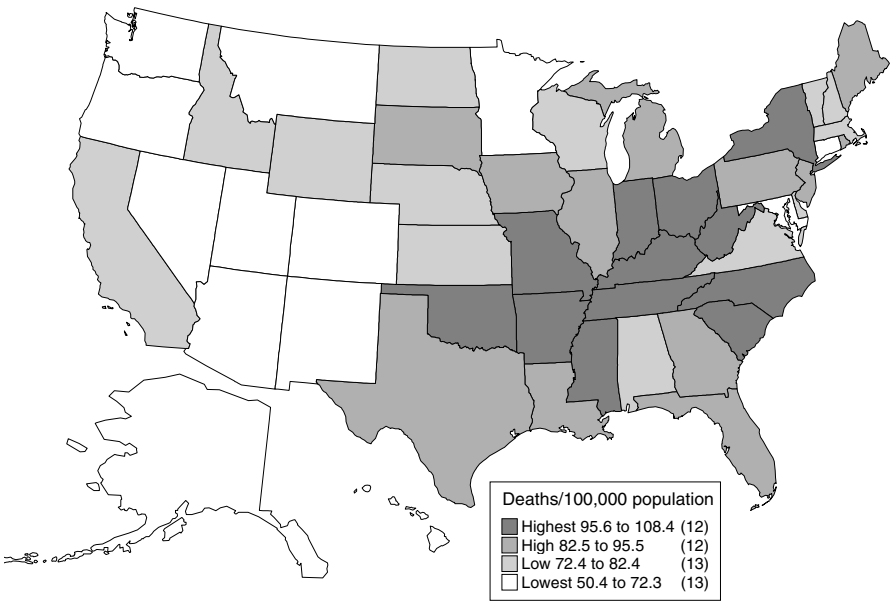


* Age-adjusted to the 1940 standard.

In 1998, CHD mortality was relatively similar in black males and in white males, higher in black females than in white females, and considerably higher in males than in females.[29]

When the 2000 standard was used, white males have slightly higher rates than black males.

Chart 3-30 (1940)
Age-Adjusted Death Rates* for Coronary Heart Disease
by State, U.S., 1995-1997

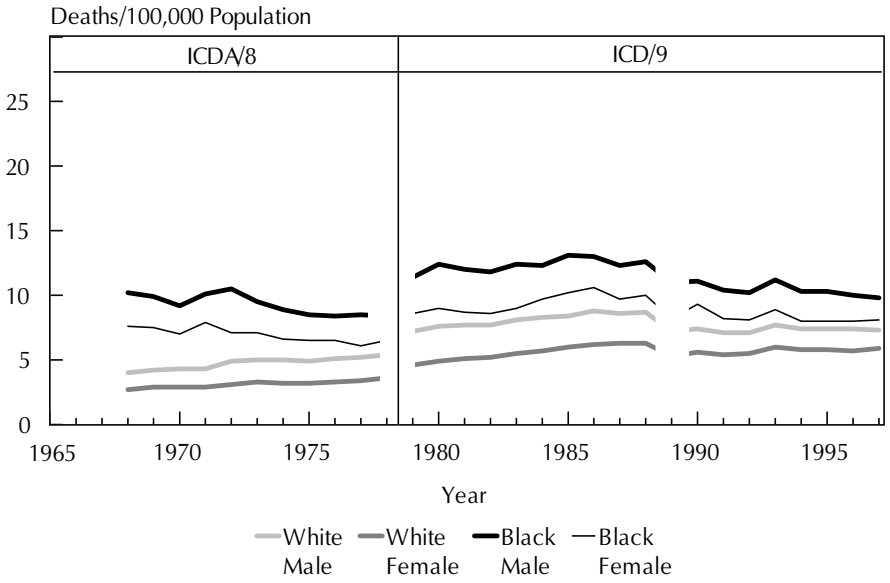


* Age-adjusted to the 1940 standard.

In 1995-97, high CHD death rates tended to be in a narrow band of states from New York through Appalachia to Oklahoma. Low rates existed in many western mountain states.[15]

Death Rates Adjusted to the 1940 Standard

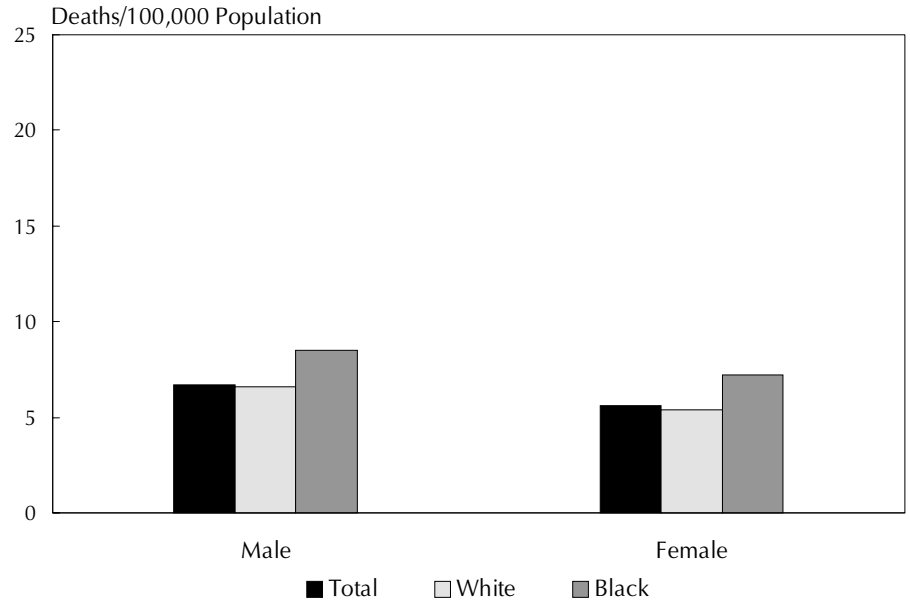
Chart 3-37 (1940)
Age-Adjusted Death Rates* for Congestive Heart Failure by Race and Sex, U.S., 1968-1997



Increasing trends in CHF death rates, which began on or before 1968 for whites and in 1979 for blacks, may have leveled off in the 1990s.[15, 22]

* Age-adjusted to the 1940 standard.
Note: The magnitude of mortality from heart failure was affected by revision of the ICD in 1979 and the change in cause-of-death coding instruction examples on death certificates in 1989.

Chart 3-38 (1940)
Age-Adjusted Death Rates* for Congestive Heart Failure by Race and Sex, U.S., 1997



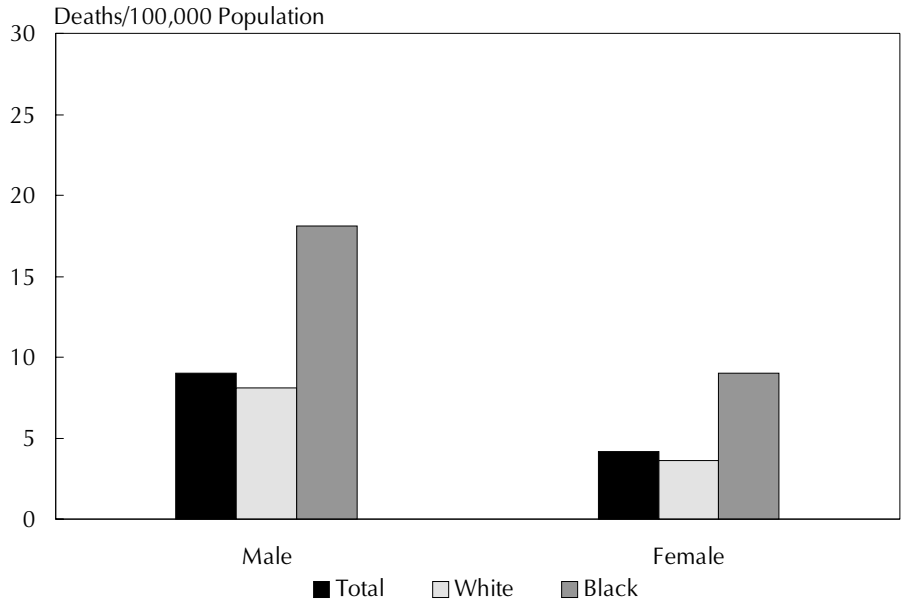
In 1997, CHF mortality was higher in blacks than in whites and higher in males than in females.[15]

The black-white difference is less pronounced when rates were age-adjusted to the 2000 standard.

* Age-adjusted to the 1940 standard.

Death Rates Adjusted to the 1940 Standard

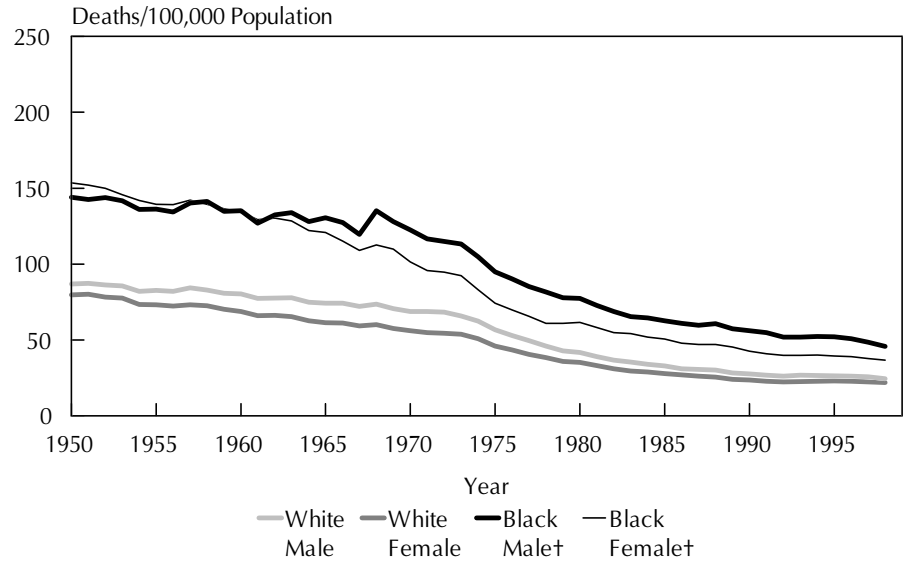
Chart 3-40 (1940)
Age-Adjusted Death Rates* for Cardiomyopathy
by Race and Sex, U.S., 1997



* Age-adjusted to the 1940 standard.

In 1997, the cardiomyopathy death rate was more than twice as high in blacks as in whites. It was also more than twice as high in males as in females.[15]

Chart 3-49 (1940)
Age-Adjusted Death Rates* for Stroke
by Race and Sex, U.S., 1950-1998

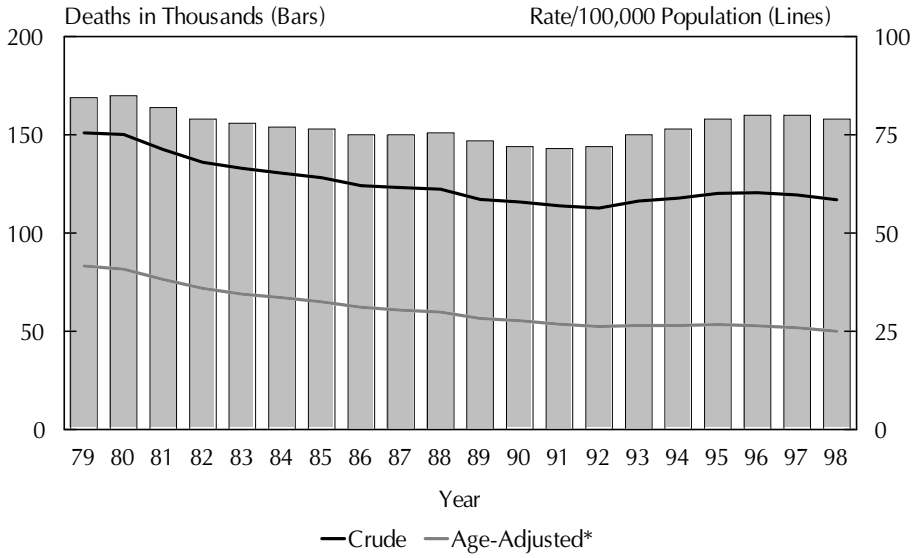


* Age-adjusted to the 1940 standard.
† Nonwhite from 1950 to 1967.

The steady and steep decline in stroke mortality that occurred for all four groups in the 1970s slowed in the 1980s and 1990s.[15, 22, 29]

Death Rates Adjusted to the 1940 Standard

Chart 3-50 (1940)
Deaths and Death Rates for Stroke, U.S., 1979-1998

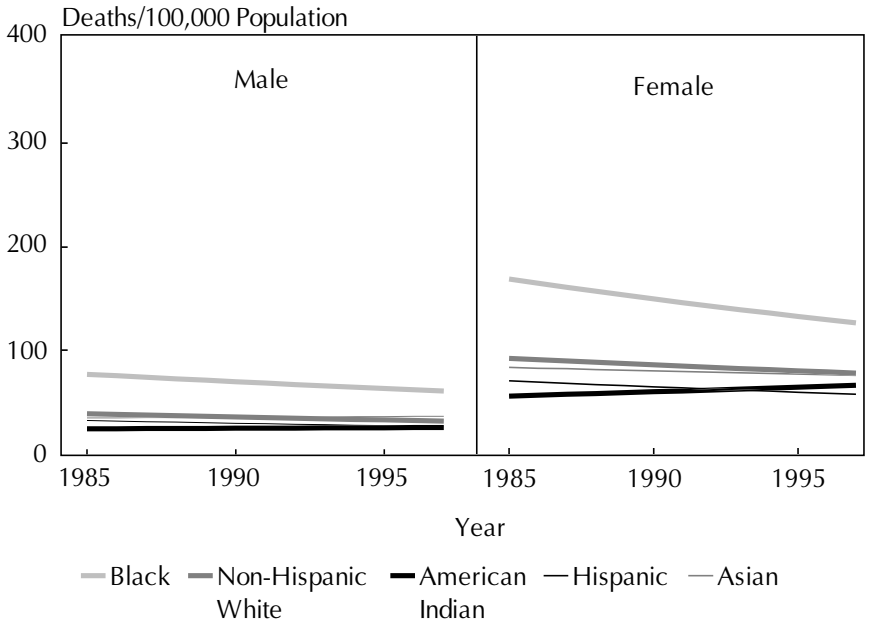


Between 1979 and the early 1990s, the number of stroke deaths and death rates, crude and adjusted, declined. Since then the number of deaths and the crude death rates have increased modestly.[15, 22, 29]

When the 2000 standard was used, the line for the crude rate is lower than the line for the age-adjusted rate.

* Age-adjusted to the 1940 standard.

Chart 3-51 (1940)
Age-Adjusted Death Rates* for Stroke by Race/Ethnicity and Sex, Age 45+, U.S., 1985-1997



Between 1985 and 1997, stroke mortality for males and females, age 45+, declined in whites, blacks, and Hispanics, but rose among American Indians. It also rose slightly among Asian males, but declined among Asian females.[12]

When the 2000 standard was used, stroke mortality decreases slightly among American Indian males.

* Age-adjusted to the 1940 standard.

Death Rates Adjusted to the 1940 Standard

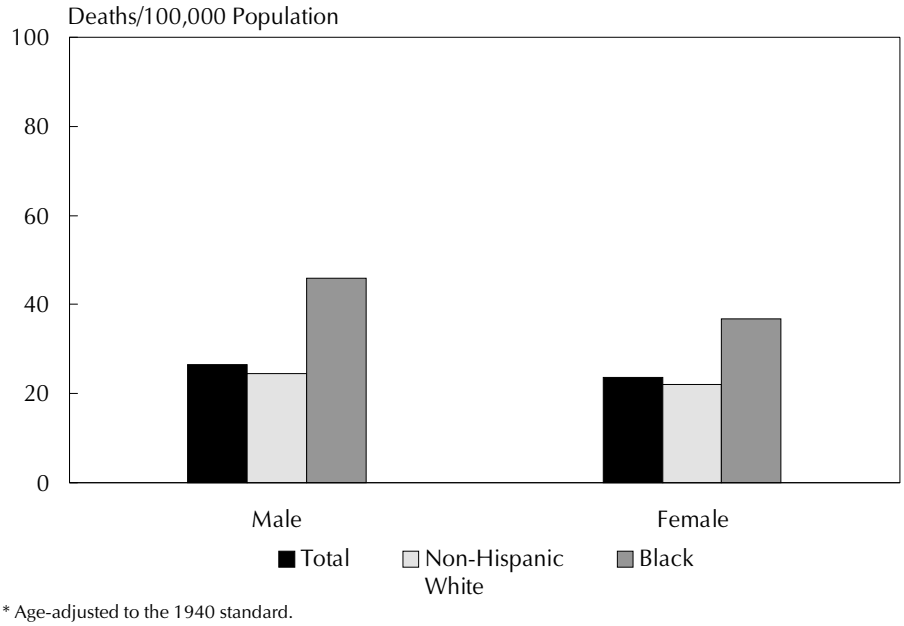
Chart 3-52 (1940)
Average Annual Percent Change in Age-Adjusted Death Rates* for Stroke by Race and Sex, U.S., 1960-1998

Period	Total Population	White Male	White Female	Black Male	Black Female
1960-1965	-1.6	-1.4	-2.1	-0.4	-2.0
1965-1970	-1.8	-1.4	-1.7	-0.5	-1.6
1970-1975	-3.8	-3.6	-3.5	-4.5	-5.6
1975-1980	-5.7	-6.2	-5.5	-4.2	-5.2
1980-1985	-4.4	-4.6	-4.5	-4.1	-3.8
1985-1990	-3.1	-3.3	-3.3	-2.1	-2.8
1990-1995	-0.6	-0.7	-0.4	-1.4	-1.3
1995-1998	-2.2	-2.6	-1.7	-4.3	-2.6

* Age-adjusted to the 1940 standard.

The steep declines in stroke mortality that occurred in males and females, and whites and blacks, during the 1970s and 1980s were followed by very modest percent changes from 1990 to 1995 and appreciable declines from 1995 to 1998.[15, 22, 29]

Chart 3-53 (1940)
Age-Adjusted Death Rates* for Stroke by Race and Sex, U.S., 1998



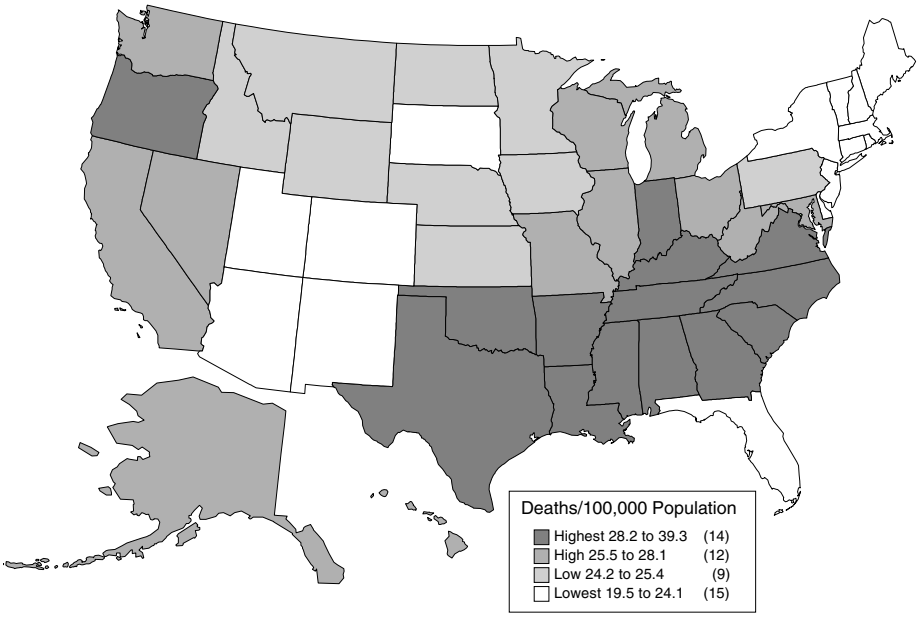
* Age-adjusted to the 1940 standard.

In 1998, stroke mortality was appreciably higher in blacks than in whites and about 13% higher in males than in females.[29]

The male-female difference is less than 3% when rates were age-adjusted to the 2000 standard.

Death Rates Adjusted to the 1940 Standard

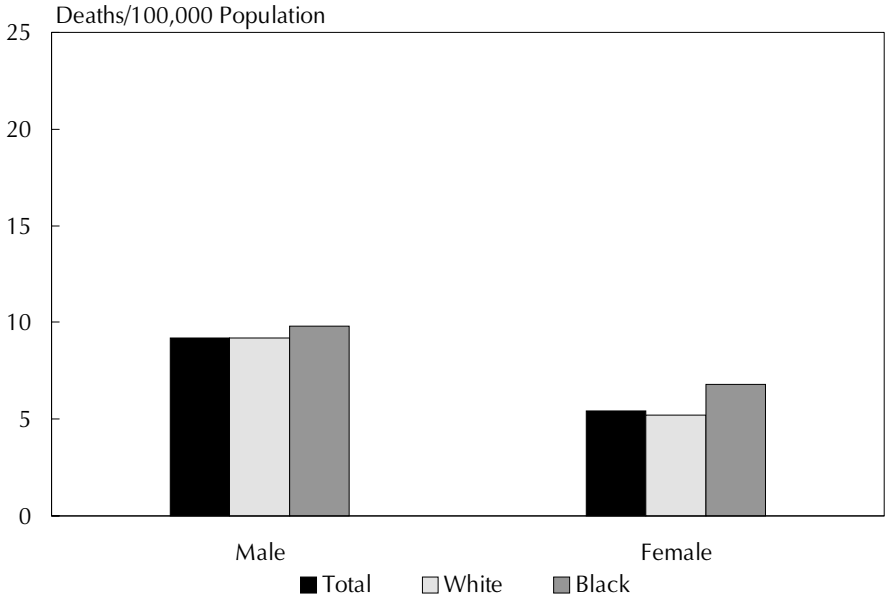
Chart 3-55 (1940)
Age-Adjusted Death Rates* for Stroke
by State, U.S., 1995-1997



* Age-adjusted to the 1940 standard.

In 1995-97, stroke mortality tended to be highest in the southeastern states, most of which compose "the stroke belt."[15]

Chart 3-63 (1940)
Age-Adjusted Death Rates* for Diseases of Arteries
by Race and Sex, U.S., 1998



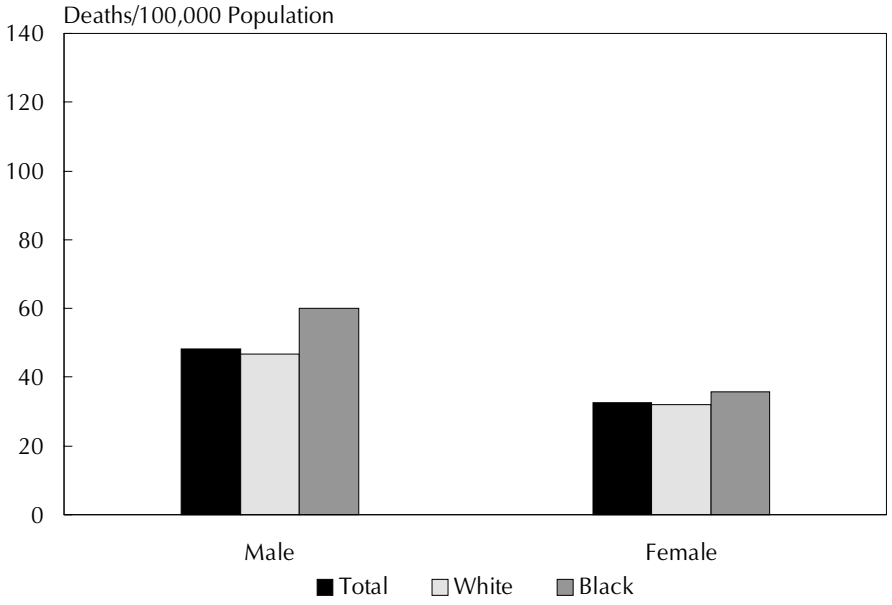
*Age-adjusted to the 1940 standard.

In 1998, death rates for diseases of arteries were higher in males than in females, and higher in black females than in white females, but were relatively similar in black males and in white males.[29]

When the 2000 standard was used, the rate is slightly higher in white males compared with black males.

Death Rates Adjusted to the 1940 Standard

Chart 4-3 (1940)
Age-Adjusted Death Rates* for Total Lung Diseases by Race and Sex, U.S., 1997

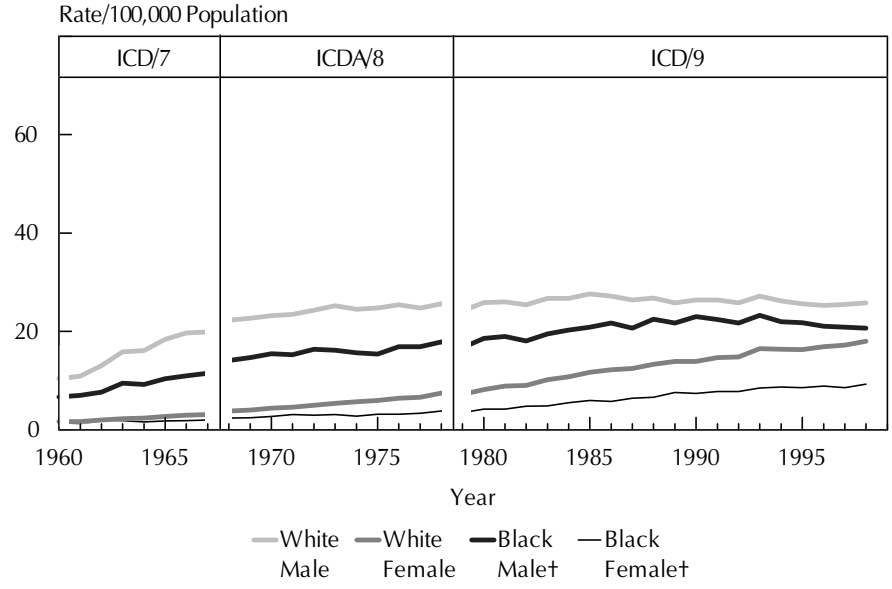


* Age-adjusted to the 1940 standard.

In 1997, lung disease mortality (other than lung cancer) was higher in males than in females, and higher in blacks than in whites for males and for females.[15]

When the 2000 standard was used, the black-white difference for males was trivial, and the rate for females was slightly higher in whites than in blacks.

Chart 4-8 (1940)
Age-Adjusted Death Rates* for Chronic Obstructive Pulmonary Disease by Race and Sex, U.S., 1960-1998

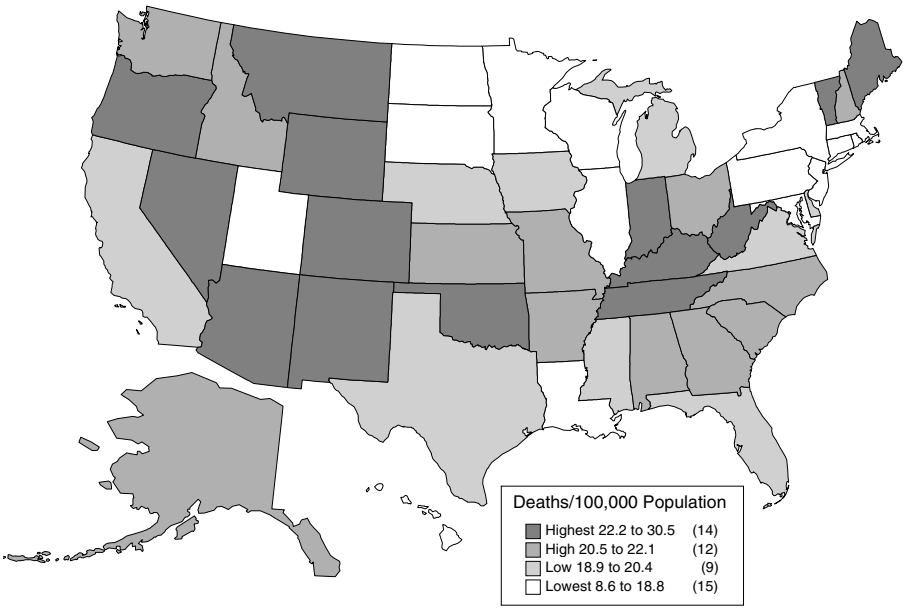


*Age-adjusted to the 1940 standard.
† Nonwhite from 1960 to 1967.

From 1960 to the mid-1980s, COPD mortality increased in white and in black males, but has remained relatively constant since then. The rate for black and for white women in 1998 has more than doubled since the mid-1980s.[15, 22, 29, 41]

Death Rates Adjusted to the 1940 Standard

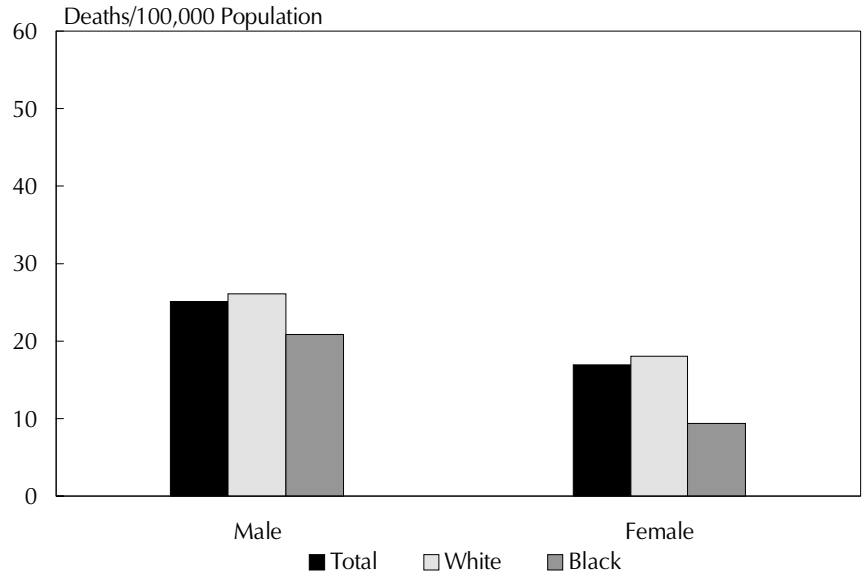
Chart 4-11 (1940)
Age-Adjusted Death Rates* for Chronic Obstructive Pulmonary Disease by State, U.S., 1995-97



* Age-adjusted to the 1940 standard.

In 1995-97, COPD mortality tended to be highest in the eastern states and western mountain states.[15]

Chart 4-13 (1940)
Age-Adjusted Death Rates* for Chronic Obstructive Pulmonary Disease by Race and Sex, U.S., 1998

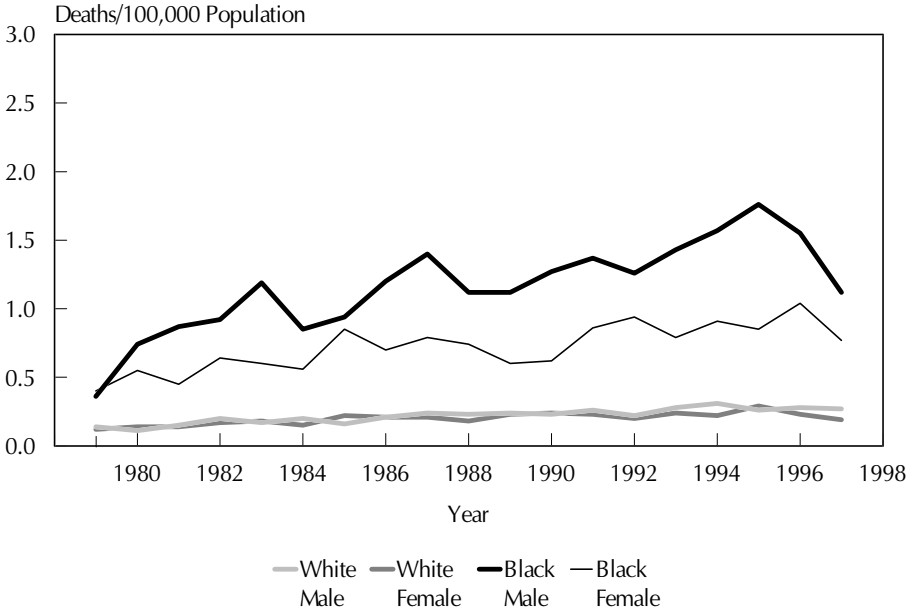


* Age-adjusted to the 1940 standard.

In 1998, COPD mortality was higher in males than in females. For males, it was one-fourth higher in whites than in blacks, and for females, it was almost 2 times higher in whites than in blacks.[29]

Death Rates Adjusted to the 1940 Standard

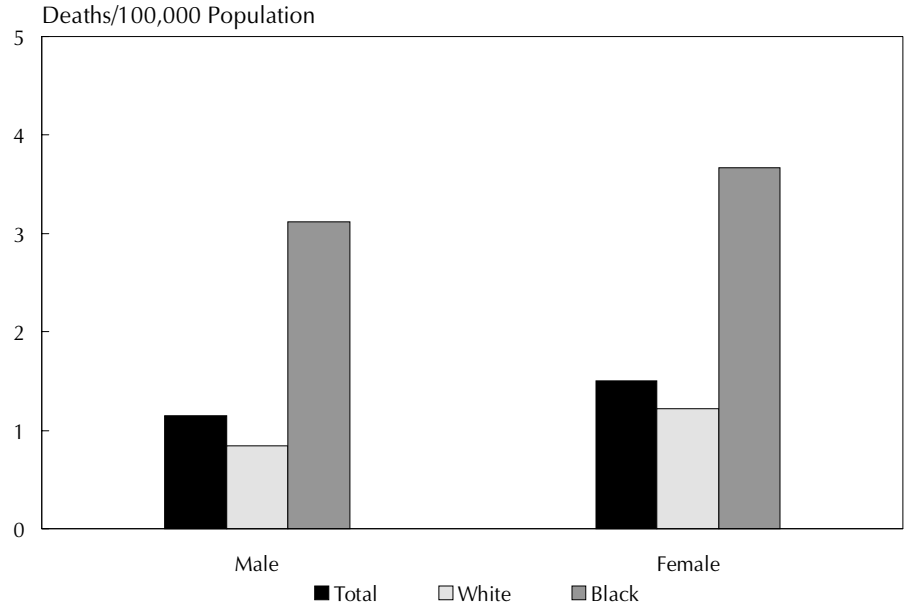
Chart 4-19 (1940)
Age-Adjusted Death Rates* for Asthma
by Race and Sex, Age 1-24, U.S., 1979-1997



* Age-adjusted to the 1940 standard.

Although asthma death rates fluctuated between 1979 and 1997, they tended to increase for each race-sex group, age 1-24.[15, 22, 29]

Chart 4-21 (1940)
Age-Adjusted Death Rates* for Asthma
by Race and Sex, U.S., 1998



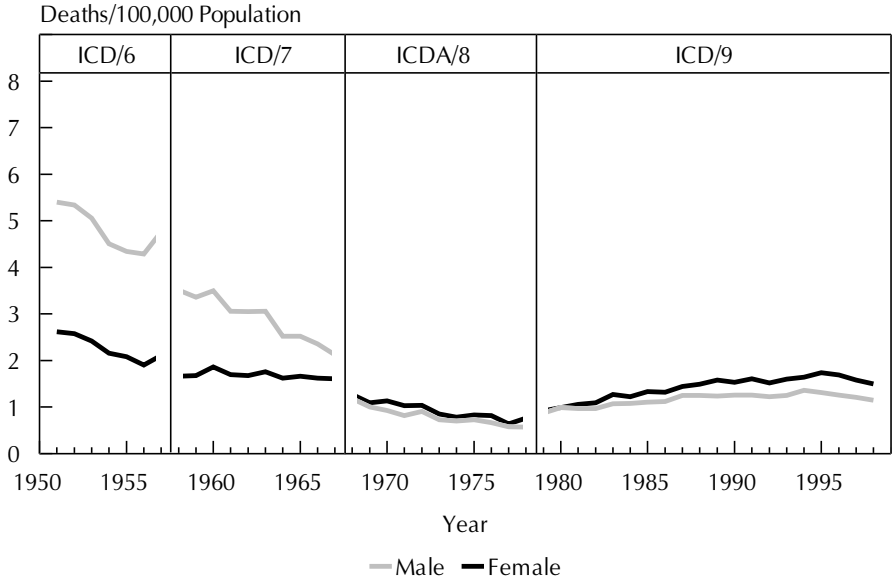
* Age-adjusted to the 1940 standard.

In 1998, asthma mortality was more than 3 times higher in black males than in white males, 3 times higher in black females than in white females, and 30% higher overall in females than in males.[29]

The black-white differences are less pronounced when rates were age-adjusted to the 2000 standard.

Death Rates Adjusted to the 1940 Standard

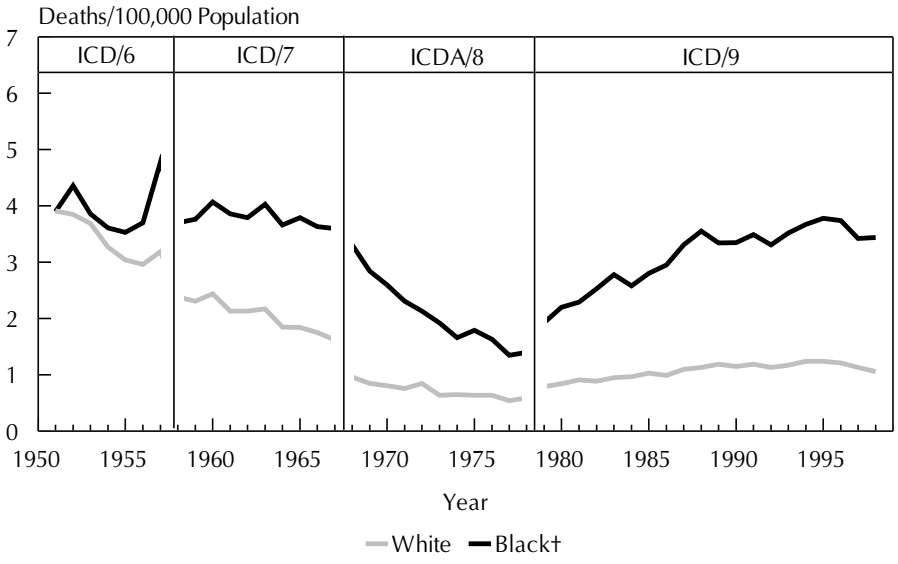
Chart 4-23 (1940)
Age-Adjusted Death Rates* for Asthma
by Sex, U.S., 1951-1998



Asthma mortality declined from 1951 to 1978 and then began to increase. Rates were much higher in males than in females before the mid-1960s, but then became higher in females than in males.[15, 22, 29]

* Age-adjusted to the 1940 standard.

Chart 4-24 (1940)
Age-Adjusted Death Rates* for Asthma
by Race, U.S., 1951-1998

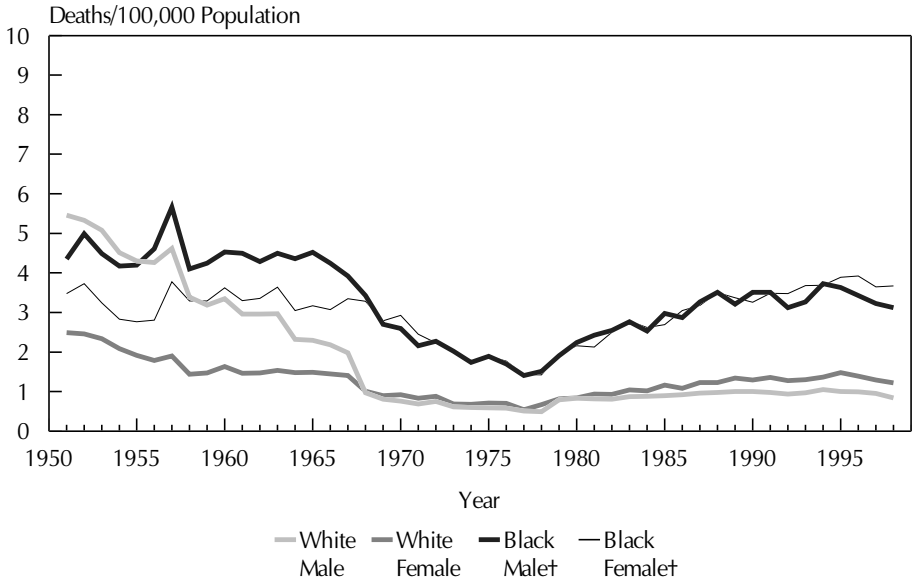


Between 1951 and 1998, the black-white gap in asthma mortality became wider, with the rate much higher in blacks than in whites.[15, 22, 29]

* Age-adjusted to the 1940 standard.
† Nonwhite from 1951 to 1967.

Death Rates Adjusted to the 1940 Standard

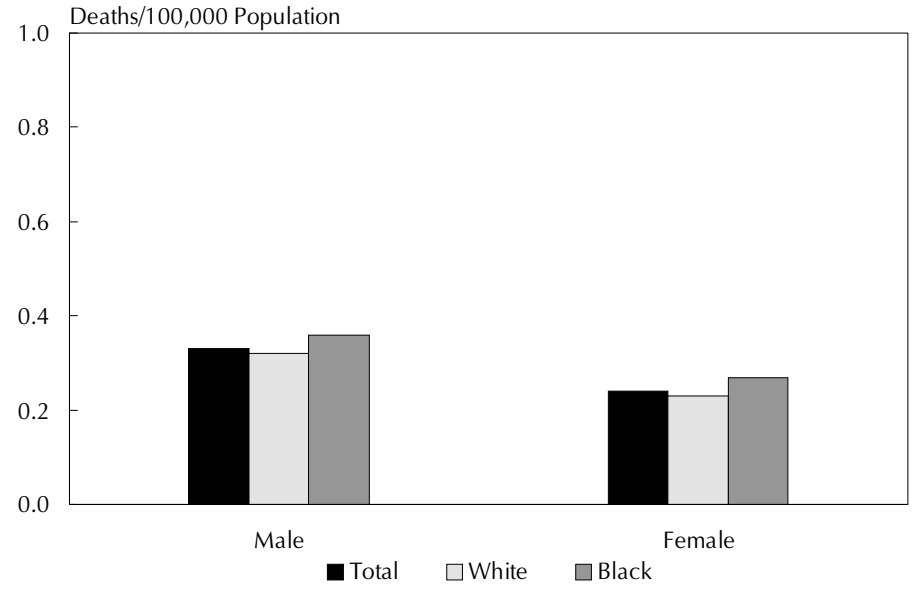
Chart 4-25 (1940)
Age-Adjusted Death Rates* for Asthma
by Race and Sex, U.S., 1951-1998



Trends in asthma mortality have been much more uniform across sex-race groups since 1970 compared with the 1950-1970 period.[15, 22, 29]

* Age-adjusted to the 1940 standard.
† Nonwhite from 1951 to 1967.

Chart 5-4 (1940)
Age-Adjusted Death Rates* for Aplastic Anemia
by Race and Sex, U.S., 1987-1997



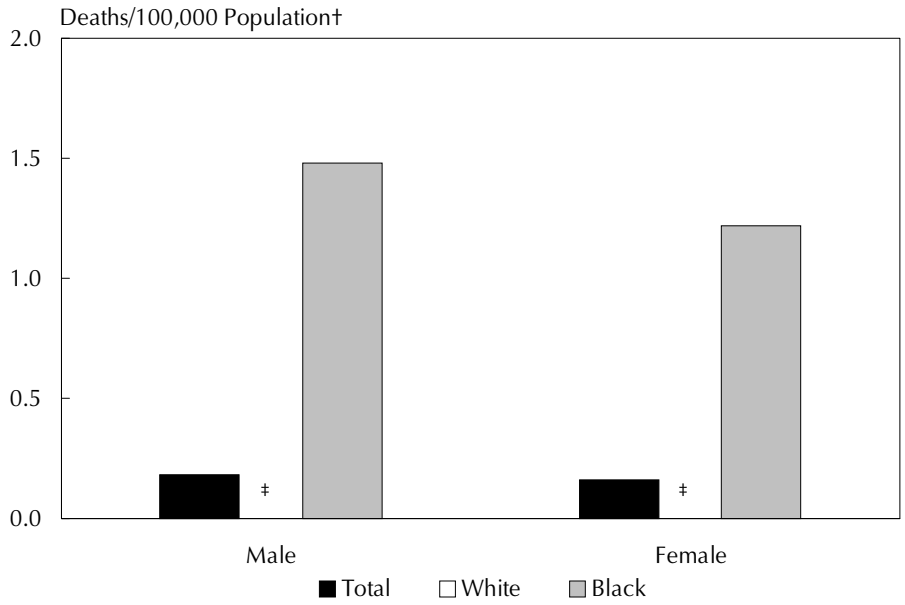
Between 1987 and 1997, mortality from aplastic anemia was higher in males than females and slightly higher in blacks than in whites for males and for females.[15]

When age-adjusted to the 2000 standard, the death rates for white females and for black females are similar.

* Age-adjusted to the 1940 standard.

Death Rates Adjusted to the 1940 Standard

Chart 5-7 (1940)
Age-Adjusted Death Rates* for Sickle Cell Anemia by Race and Sex, U.S., 1987-1997



Between 1985 and 1997, mortality from sickle cell anemia occurred predominantly in blacks, with males having a slightly higher death rate than females.[15]

* Age-adjusted to the 1940 standard.
† Average annual rates.
‡ Rates for white males and females are less than 1/2 of 1 percent.

Appendixes

Appendix A

International Classification of Diseases: Codes for Selected Diagnostic Categories
(First, Second, Third, Fourth, and Fifth Revisions)

Diagnostic Term in Chartbook	ICD/1 1900-1909	ICD/2 1910-1920	ICD/3 1921-1929	ICD/4 1930-1938	ICD/5 1939-1948
Cardiovascular diseases[a]	47, 64-66 77-66, 142	47, 64-66, 77-85, 142	87-90, 91,[b,c] 92-96, 151	56, 82, 90-95, 97-103	58, 86 90-103
Heart disease[b]	77-80	77-80	87-90	90-95	90-95
Cerebrovascular diseases (stroke)[c]	64-66, 82	64-66, 82	74, 75, 83	82	83

[a] This group includes diseases of the circulatory system and cerebrovascular diseases as coded in each ICD revision. Renal diseases are not included under "Cardiovascular diseases."[43]

[b] The ICD/1 and ICD/2 terms are pericarditis, acute endocarditis, organic diseases of the heart, and angina pectoris; the ICD/3 terms are pericarditis, endocarditis, myocarditis (acute), and other diseases of the heart; the ICD/4 terms are chronic rheumatic diseases of heart, diseases of coronary arteries and angina pectoris, and diseases of heart (other forms); and the ICD/5 term is diseases of the heart (all forms).

[c] The ICD/1 and ICD/2 terms are cerebral hemorrhage, apoplexy, softening of the brain, embolism, and thrombosis; the ICD/3 terms are cerebral hemorrhage, embolism, thrombosis, paralysis without specified cause, and softening of the brain; the ICD/4 terms are cerebral hemorrhage, embolism, and thrombosis; and the ICD/5 term is intracranial lesions of vascular origin.

Appendix A (continued)

International Classification of Diseases: Codes for Selected Diagnostic Categories
(Sixth, Seventh, Eighth, and Ninth Revisions)

Diagnostic Term in Chartbook	ICD/6 1949-1957	ICD/7 1958-1967	ICDA/8 1968-1978	ICD/9 1979-1998
Cardiovascular diseases[a]	330-334, 400-468	330-334, 400-468	390-458	390-459
Heart disease	400-402, 410-443	400-402, 410-443	390-398, 402, 404-429	390-398, 402, 404-429
Coronary heart disease[b]	420	420	410-413	410-414
Acute myocardial infarction	*	*	410	410
Heart failure[c]	†	†	427.0, 427.1	428
Rheumatic heart disease[d]	400-402, 410-416	400-402, 410-416	390-398	390-398
Cerebrovascular diseases (stroke)[e]	330-334	330-334	430-438	430-438
Diseases of arteries	450-456	450-456	440-448	440-448
Congenital anomalies of the circulatory system[f]	†	†	746-747	745-747
Chronic obstructive pulmonary disease[g]	500-502, 527.1	500-502, 527.1	490-492, 519.3	490-492, 494-496
Asthma	241	241	493	493

[a] The ICD term is diseases of the circulatory system.
[b] The ICD/6 and ICD/7 term is arteriosclerotic heart disease; the ICDA/8 and ICD/9 term is ischemic heart disease.
[c] The ICDA/8 terms are congestive heart failure and left ventricular failure. The ICD/9 term is heart failure (428) or CHF (428.0)
[d] The ICD/6 and ICD/7 terms are rheumatic fever and chronic rheumatic heart disease. The ICD/9 terms are active rheumatic fever and chronic rheumatic heart disease.
[e] The ICD/6 and ICD/7 term is vascular diseases affecting the central nervous system; the ICDA/8 and ICD/9 term is cerebrovascular disease.
[f] The ICDA/8 terms are congenital anomalies of heart and other congenital anomalies of circulatory system. The ICD/9 terms are bulbus cordis anomalies and anomalies of cardiac septal closure, other congenital anomalies of heart, and other congenital anomalies of circulatory system.
[g] The ICD/6 and ICD/7 terms are chronic bronchitis, unqualified bronchitis, and emphysema without mention of bronchitis; the ICDA/8 terms are chronic bronchitis, unqualified bronchitis, emphysema, and chronic obstructive lung disease; the ICD/9 terms are chronic bronchitis, bronchitis not specified as acute or chronic, emphysema, bronchiectasis, extrinsic allergic alveolitis, and chronic airways obstruction not elsewhere classified.
* No code for this category exists in this ICD revision.
† No data for this category are presented in the chart book in this period.

Appendix B

Definition of Terms

Age-adjusted death rate:	The age-adjusted death rate is a summary death rate for the given age range and is computed by a direct method, that is, by applying the age-specific death rates for a given cause of death to the standard population (e.g., United States, 1940, 1970, 1980, or 2000) distributed by age in 10-year age groups.[9, 12]
Chronic condition:	A condition is considered chronic if (1) the respondent (in a health interview) indicates it was first noticed more than 3 months before the reference date of the interview, or (2) it is a type of condition that ordinarily has a duration of more than 3 months.[25]
Comparability ratio:	The comparability ratio is the number of deaths from a particular cause of death as coded to an ICD revision divided by the number of deaths from the closest similar cause of death as coded to the preceding ICD revision. This dual coding is done on a sample of death certificates for a particular year. These ratios measure discontinuities in mortality data resulting from the introduction of a new ICD revision.[8]
Hospitalization:	For this chart book, hospitalization refers to hospital discharge that is the formal release of a hospital inpatient, that is, termination of a period of hospitalization by death or by disposition to place of residence, nursing home, or another hospital. First-listed diagnosis is the coded diagnosis identified as the primary diagnosis or that diagnosis listed first on the face sheet of the hospital medical record. Hospital means non-Federal, short-stay special and general hospital of six beds or more for inpatient use and an average length of stay of less than 30 days.[12]
Incidence:	Incidence is the number of cases that had their onset during a specified period of time.[43]
Infant mortality rate:	The infant mortality rate is the number of deaths from a cause of death (or all causes) occurring at younger than age 1 year in a particular year divided by the number of live births occurring that year, expressed as a rate per 1,000 live births.[12]
Limited in activity:	Also called chronic activity limitation, it refers to the limitation of a person's usual activity due to a chronic condition.[27]
Morbidity:	For this chart book, morbidity refers to incidence, prevalence, hospitalizations, and physician office visits.
Prevalence:	The prevalence of a condition is the number of persons who have the condition at a given time.[12]

Appendix B

Definition of Terms (continued)

Standard error:	The standard error is primarily a measure of sampling error (not measurement error), that is, the variation that might occur by chance because only a sample of the population is surveyed. The relative standard error of an estimate is obtained by dividing the standard error of the estimate by the estimate itself.[27]
Underlying cause of death:	The underlying cause of death is the disease or injury that initiated the events leading directly to death. It is selected from the conditions entered in the cause-of-death section of the death certificate. When more than one cause or condition is entered by the physician, the underlying cause is determined by the sequence of conditions on the certificate, provisions of the ICD, and associated classification rules.[12]

Appendix C

Abbreviations*

AMI	Acute Myocardial Infarction
CHD	Coronary Heart Disease
CHF	Congestive Heart Failure
COPD	Chronic Obstructive Pulmonary Disease
CVD	Cardiovascular Diseases
HCFA	Health Care Financing Administration
ICD	International Classification of Diseases
ICDA	International Classification of Diseases, Adapted for Use in the United States
NCHS	National Center for Health Statistics
NEC	Not Elsewhere Classified
NHANES	National Health and Nutrition Examination Survey
NHIS	National Health Interview Survey
NHLBI	National Heart, Lung, and Blood Institute
WHO	World Health Organization

* Country abbreviations may be found on the following page.

Appendix C

Abbreviations (Continued)

AUL	Australia
AUS	Austria
BEL	Belgium
BUL	Bulgaria
CAN	Canada
DEN	Denmark
E&W	England and Wales
FIN	Finland
FRA	France
GER	Germany
GRE	Greece
HUN	Hungary
IRE	Ireland
ISR	Israel
ITA	Italy
JPN	Japan
NIR	Northern Ireland
NOR	Norway
NTH	Netherlands
NZE	New Zealand
POL	Poland
POR	Portugal
ROM	Romania
SCO	Scotland
SPA	Spain
SWE	Sweden
SWI	Switzerland
USA	United States of America

Appendix D

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Discrimination Prohibited: Under provisions of applicable public laws enacted by Congress since 1964, no person in the United States shall, on the grounds of race, color, national origin, handicap, or age, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity (or, on the basis of sex, with respect to any education program or activity) receiving Federal financial assistance. In addition, Executive Order 11141 prohibits discrimination on the basis of age by contractors and subcontractors in the performance of Federal contracts, and Executive Order 11246 states that no federally funded contractor may discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. Therefore, the Heart, Lung, and Blood Institute must be operated in compliance with these laws and Executive Orders.

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